FASTI TEMPORIS CATHOLICI

AND

ORIGINES KALENDARIÆ.

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VOLUME I.

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PATRONIS : SVIS : ET : DE : SE : OPTIME : MERITIS

OBSERVANTIAE : ERGA : SINGVLOS : GRATI : ANIMI : ERGA : VNIVERSOS

NOMINE : INSCRIBIT : AVCTOR.

ADDRESS TO THE READER.

AMONG the numerous works on Chronology, which have appeared at different times, very few have treated professedly of any branch of that subject except the Historical. And yet there are two other branches, each of them in the nature of things prior to the historical; and each of them necessary to it also: as is shewn more at large in the first Dissertation of the following Work.

One of these is Pure Chronology, the other is Mixed Chronology; names and distinctions on which it would be premature to enlarge at present. It is the object of the ensuing Work to supply the desideratum which still exists in this one department of literature; by treating *in extenso* of those two other branches of a common subject, which are in reality the most important part of the whole, and yet have been hitherto most generally neglected, or most imperfectly discussed: and therefore are least understood at present. And in this object, to the best of the Author's knowledge, it has not been anticipated by any former publication; particularly upon that scale

which will be found to be contemplated in this Work. It cannot therefore be objected to it that such a work was superfluous; though it treats nominally of the very same subject as a great number of others which have preceded it.

But its first and proper business is with Pure and Mixed Chronology alone. With Historical it has to do merely as subservient to the investigation, the illustration, and the exemplification of the other two; especially to that of Mixed Chronology. Consequently it naturally divides itself into two Parts; one of them devoted to the subject of Pure Chronology, the other to that of Mixed: the former entitled *Fasti Temporis Catholici;* the latter *Origines Kalendariæ:* names and distinctions which also are explained in the course of the Work.

The proper subject matter of the first of these divisions, the Fasti Temporis, admitted of being fully discussed in the early part of the Work; and it will probably be found that justice has been done to it there, and that every thing has been investigated and explained which required to be so, within reasonable bounds. And possibly it may also appear to the judgment of competent persons, that the principles of Pure Chronology have thereby for the first time been placed on their proper foundation; and that the science itself has consequently, for the first time also, been raised to its proper position among the exact sciences; and to that degree of dignity and preeminence in com-

parison of the rest, which was always its due, but had never before been awarded to it: and to which none could lay claim besides except astronomy. Astronomy itself is chronology too, under a different name, and in a special and restricted relation to other things.

But with respect to the subject of the second division, the Origines Kalendariæ; if it is not, in its own nature, absolutely unlimited and indefinite, it is quite as extensive and quite as diversified as the Civil Calendar: of which it professes to be the Historian throughout. There is no limit to the possible scope and comprehension of this part of the subject, but what may possibly also have been prescribed, either by the nature of things or by the matter of fact, to the modifications and varieties of the Civil Calendar, at any time and any where.

It can never be said that this argument has been exhausted, and that complete justice has been done to this branch of the subject, until every artificial and positive system and measurement of time, (i. e. every Calendar,) which once had an actual existence among mankind, and is capable of being recovered, in any form and to any extent, at the present day, or still has an actual existence among mankind, shall have passed in review, and shall have been treated of, in its turn. And as no one could venture to say beforehand, what discoveries of this kind, in addition to those which will be found to have been pointed out in

the ensuing Work, may yet be made by means of inquiries properly directed, (such as have never yet been instituted, or on an adequate scale,)it is far from improbable that the subject itself may turn out for a time to be a *growing* one; enlarging with its own discussion, and opening a wider and wider field of research the more it is explored and investigated. Of the capabilities at least of such a subject, the Author may be permitted to speak from his own experience; and abundant proof in fact will be produced even in the course of the ensuing Work: though it is not in the nature of things that justice should be done to such a subject by *one*, and in particular by a *first*, attempt; or by the unassisted inquiries of one individual. The subject itself is competent to employ *all* the learned, and *every where*, at least for a time; though each should confine himself in the first instance to so much of the whole in general as may concern his own country in particular. If this argument is ever exhausted, it must be the effect of time; of a concurrence of labours and exertions, going on simultaneously or successively, in all parts of the world: of a series and chain of discoveries one after another; and of an uninterrupted succession of additions to the general stock of knowledge.

A very numerous list of Calendars is proposed in the proper part of this Work, many of which might have been selected, with equally good reason, both to illustrate and to confirm the principles and propositions which are explained and defended in

the introductory part of it. In particular the Calendars of classical antiquity, the ancient Hellenic and the ancient Italic or Roman; the former an exceedingly numerous family of its kind, and full of interest to the classical student: the latter not so numerous, but infinitely more important and more interesting at the present day; because it is still represented by a living Calendar. It is the parent of the Julian or Gregorian, of this very day; when this is traced back to the beginning of its existence. The necessity of the case has compelled the Author, in this first contribution to the subject, to confine himself to one example of the proper kind. And it is highly satisfactory to him to be able to assure his readers, that the common end, which must still be proposed by how many soever examples of the same kind, may be adequately attained even by one: and is adequately attained even by *this one.* And though the present Work, in its relation to such a subject as that of the Origines Kalendariæ in general, is only part of a much more extensive and a much more complicated argument; it is an *integral* part. It is complete in itself. It is qualified to stand alone; and yet to justify every inference founded upon it, by means of its own proper evidence only. It will answer its purpose of illustration and verification, in subserviency to a most important conclusion, whether it be succeeded in due time by more of the same kind, and from the same quarter, or not: for that must depend upon circumstances over which the Author has no control.

It was naturally to be expected that having embarked upon an undertaking in which no one had preceded him, and there was no past experience to guide and direct his course; in which he had to feel his way at every step, like one who was walking in the dark; the subject of which, and almost the object of which, was scarcely intelligible to himself at first; the Author should not attain at once to clear views and perceptions on every point: that his first impressions in some instances should turn out to have been mistaken; and that one principal means, in the hands of an unseen Providence, to conduct him to the final discovery of the truth, should be the progress of the Work itself. It ought therefore to excite no surprise that a very important part of the entire Work has been reserved for the last; viz. the Appendix annexed to the fourth volume, under the title of "Addenda et Corrigenda."

The first idea of the present undertaking humanly speaking is to be attributed to *this* circumstance; viz. That there were certain difficulties, connected with the application of the measures of time, and in particular of the hebdomadal cycle, to the facts of the Gospel history, which had long occupied the attention of the Author; and the final explanation of which, he was at length convinced, must be sought for and found, if at all, only by going back to the very origin of time itself, and especially of the hebdomadal cycle. For every other method of solving such problems had been

tried; yet apparently with no better success than that of committing testimony of one kind and testimony of another kind, on the very same matters of fact. To do this however was to enter on those inquiries which are the proper business of the Fasti Temporis of the following Work. The event has proved that in coming to this conclusion the Author was not mistaken. Those difficulties are now explained by the mere course and succession of time itself, which never could be explained in any other way. The present Work consequently supplies the only confirmation of the general and substantial truth of the Author's former Works, which was still wanting. Nor is it the least satisfactory of its results, that it has established those points most completely which seemed to be most open to doubt and contradiction; and which in fact had been most distinctly called in question. Even the Author may now be permitted to say without impropriety that the scheme of Historical Chronology, represented in his Dissertations, his Prolegomena, and his Harmonia Evangelica, in its principal or cardinal dates must be true; and that none else can be true: because none else can be confirmed by the testimony of time itself, and especially by that of the hebdomadal cycle, from first to last.

Lastly, his grateful thanks are again due to the Delegates of the University Press.

Nor must he omit to acknowledge his obligations to those distinguished members of the University

of Cambridge, Professor Challis, and Mr. Adams; from each of whom he has received at different times the most valuable assistance on points connected with their own science of astronomy.

A volume of Tables necessarily accompanies this Work; the explanation of which too has required a volume for itself, entitled "Introduction to the Tables of the Fasti Catholici, both the General and the Supplementary."

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CHAPTER I.

SECTION I.

THE word Chronology, which is of common occurrence in the English language, is borrowed from the Greek; and to judge from the component parts of the word in Greek, (*χρόνος* and *λόγος*,) it must have been intended in that language of the "reason" or "account of time;" just as astrology, in its original and proper acceptation, was meant of the reason or account of stars.

Chronology then is the SCIENCE of TIME; as zoology is the science of animals, physiology is the science of nature. Its subject-matter is Time; the nature, the laws, and the measures of time; the distinctions, the modifications, and the combinations of time. These are what it treats of, or is bound to treat of. To resolve these into their first principles; to exhibit these both in themselves and in their connection with one another; to prepare and adjust these for any ulterior use and purpose to which they are naturally subservient: these are the duties and this is the business of Chronology, especially as auxiliary to history or to astronomy. It is impossible therefore to advance a step in the consideration of Chronology, without premising some account of time.

Section II.—*Of Duration and Space.*

Now the most general conception which we can form of time is that of a particular mode of something else, which we call Duration. Duration appears to be the *generic*, time the *specific* idea of the same thing; and therefore, in order to convey a clear and correct notion of time, it would seem to be necessary that we should endeavour to convey in the first place a clear and distinct idea of duration.

To communicate however this clear and distinct idea of duration, through any medium more clear and distinct than itself, does not appear to be practicable. It is of the nature of primary and simple ideas of every kind, not to be capable of being made known, or apprehended, through any ideas more simple and more intelligible than themselves: for which reason too the things denoted by such ideas cannot be defined, though they may be described and so far illustrated in various ways. And this is eminently true of Duration. Every one is familiar with the notion of duration in general; that is, with the thing implied in the use of this term: but no definition can make it simpler or clearer than it is in itself.

All that we can do in a case like this is to remind ourselves of our daily experience and our daily observations; to appeal to our constant and habitual perceptions. We know from experience what it is to *be*, and to feel that we *are* in *being*; to *continue* in being, and to be conscious that we are so *continuing*; to be connected with other things beyond and beside ourselves, and to feel that we are so connected; and with things which remain the same, and which we know to be remaining the same, just as much as ourselves.

Now this simple perception of continuance, this constant conviction of uninterrupted existence and of identity in ourselves and in every thing else with which we are connected, abstracted, (if that were possible,) from all individual relations, would be the simple idea of duration; that is of being and continuance in being with no particular respect to any one subject, or to any one form, of the continuance more than another; but one and the same in

every thing to which it was applicable; liable to no distinctions of more or less; capable indeed of coming to an end in particular instances, and so of terminating in such cases altogether, but not capable, while it lasted, of change or modification of any kind.

Now with duration, thus understood, chronology can have nothing to do. Duration in this sense is continuance without beginning and without end. It is continuance independent of every thing supposed to be continuing; abstracted from all circumstantial relations; referrible neither to time nor to place; incapable of any of the affections of variable quantities; without parts or distinctions of any kind to mark or to discriminate its progress, and flowing on in the same unbroken and invariable course for ever. Duration in this sense must be dismissed altogether from the scope and comprehension of chronology, that is of the science of time*; because time, however much akin to duration, is not duration after all, at least in this highest, this most abstract, most unlimited, and yet most proper and essential form of its existence.

There is one other idea, just as simple and inexplicable in itself, and just as intelligible or unintelligible to a finite understanding, as this of duration, yet closely connected with it too; viz. the idea of space. For in what manner soever the association of these two ideas is to be explained, the association itself appears to be founded in the laws of thought, and in the mutual relations of the things themselves; so that it is scarcely possible to think of duration, and not to be thereby reminded of space. And whether it

* The Greek language has no name for duration in the sense thus explained but *αἰών*: nor the Latin any but ævum: into the meaning of both which we hope to have a future opportunity of inquiring.

Censorinus too dismisses duration under the name of ævum, or of time in its most indefinite and unlimited form, from the scope of his own work: Ceterum de ævo, quod est tempus unum et maximum, non multum est quod in præsentia dicatur. est enim immensum, sine origine, sine fine, quod eodem modo semper fuit, et semper futurum est, neque ad quemquam hominum magis quam ad alterum pertinet.... quapropter ævum neque annorum neque sæculorum nec denique ullo finiti temporis modulo metiri conabor. hæc enim ad ætatem infinitam non sunt brumalis unius instar horæ. De Die Natali, cap. xvi.

may be assumed as an intuitive perception or not, it must be evident on reflection, (and it is certainly capable of demonstration,) that as duration is and must be *eternal,* so space is and must be *infinite;* and *eternal* and *infinite* are almost convertible terms. But space as infinite, and duration as eternal, are beyond the comprehension of finite intelligences; and must both be set aside from the scope of finite inquiries. Nothing is commensurate with the former but the essence of God, nor with the latter but the existence of God; and nothing can grasp or comprehend either but the mind of God. It is the prerogative of the unoriginated and infinite Being alone to fill all space, and to exist through all eternity; and it is peculiar to the infinite understanding only to take in at once both the immensity of space and the eternity of duration.

Section III.—*Of Time and Place.*

But though duration and space in the simple unqualified sense of each of those terms are thus beyond the limits of the human apprehension; yet every one must be aware on a moment's reflection, that there is after all a particular mode of duration, which is intelligible to him and familiar also; and there is a certain modification of space, with which he is well acquainted, and which he has no difficulty in comprehending; the former of which he will recognise at once under the name of Time, and the latter under that of Place. And these terms and ideas too, we perceive, are naturally just as much associated in our own apprehensions, and do as naturally imply or suggest one another, as those of duration and space. We perceive also that the relation of each of these secondary ideas to the primary one is much the same: that *place,* for instance, is *space* defined and limited in a certain manner, and *time* is *duration* defined and limited after a certain manner also; that *place* is a part or segment of *space,* and *time* is a part or segment of *duration;* that *place* may be indefinitely extended, yet will still fall short of the immensity of *space;* and *time* may be indefinitely continued, yet will still come short of the eternity of *duration;* that something *ab extra,* distinct from *space,* is necessary to determine *place,* and something *ab extra,* or not derived from

duration itself, to constitute *time*; that a body possessed of extension, substance, and figure or outline, yet remaining at rest, is indispensable to fix and define *place*, and that motion, perpetually terminated yet always continued, iteration, renewal, and yet notwithstanding continuity of some kind or other, are necessary to constitute *time*. We perceive too that, as considered in its relation to other things distinct from itself, Place is more properly connected with the material world, and Time, similarly contemplated, is more properly so with the moral; that all matter and substance, short of the divine essence itself, is circumscribed by place, and all actions and events are comprehended and bounded by time; and yet that there is a closer connection between place and the body which occupies place, than between time and the events which happen in time; that one body only can occupy a given place, and that all others must be excluded from it, but that many events may happen at the same time, and none of them interfere with another: yet, on the other hand, that the same place may be occupied by any number of bodies in succession, but the same event can happen only once, and at one time. And (to mention no more points of resemblance between these two ideas and their relations to other things distinct from themselves) we see that as time is the proper subject-matter of one science, so place is that of another; and that both time and place are the proper subject-matter of other sciences. Chronology has time for its subject-matter, and Geography has place; History and Astronomy have for theirs both time and place; the former, in connexion with all events, both moral and physical, the latter, in connexion with a particular class of physical.

Section IV.—*On the definitions of time, given by the ancient philosophers.*

Our business at present being confined to Chronology, it is proper that we should restrict our inquiries to the subject of time, without any further notice of space or of place. We shall begin therefore with endeavouring to collect, from the most general data available for such a purpose and open to ourselves, an intelligible idea of time; avoiding as much as possible all metaphysical distinctions, and insisting on no-

thing which is not of a real, an experimental, and sensible nature; and which does not carry the evidence of its truth along with itself.

The principal definitions of time, proposed by the philosophers of antiquity, have been collected by Sextus Empiricus: and we cannot do better than begin with reciting them after him[a].

Χρόνον γὰρ εἶναί φασιν οἱ μὲν διάστημα τῆς τοῦ χρόνου κινήσεως· χρόνον δὲ λέγω τὸν κόσμον· οἱ δὲ αὐτὴν τὴν κίνησιν τοῦ κόσμου. Ἀριστοτέλης δὲ, ἢ ὥς τινες, Πλάτων, ἀριθμὸν τοῦ ἐν κινήσει προτέρου καὶ ὑστέρου· Στράτων δὲ, ἢ ὥς τινες, Ἀριστοτέλης, μέτρον κινήσεως καὶ μονῆς. Ἐπίκουρος δὲ, καθὼς Δημήτριος ὁ Λάκων φησὶ, σύμπτωμα συμπτωμάτων, παρεπόμενον ἡμέραις τε καὶ νυξὶ καὶ ὥραις, καὶ πάθεσι καὶ ἀπαθείαις, καὶ κινήσεσι καὶ μοναῖς. κατ᾽ οὐσίαν τε, οἱ μὲν σῶμα αὐτὸν ἔφασαν εἶναι, ὡς οἱ περὶ τὸν Αἰνεσίδημον· μηδὲν γὰρ αὐτὸν διαφέρειν τοῦ ὄντος καὶ τοῦ πρώτου σώματος· οἱ δὲ ἀσώματον[b].

There would be something to object to each of these definitions, were it necessary for our particular purpose to examine them in detail. The most exceptionable of all is that which is ascribed to Epicurus, and represents Time as "an accident of accidents, (or an event of events,) following in the train of days and nights and hours, of passions and apathies, of motions and restings." The absurdity of such a definition is almost self-evident: as if time itself could be an accident of events, all of which happen, and must happen, in time: or as if passion, or the absence of passion, (moral or physical perturbations of any kind,) could be the proper criterion of the continuity or of the distinctions of time; or as if any sort of motion, or any sort of rest and cessation from motion, were proper to constitute time: or as if days and nights in particular, which are themselves the primary and elementary principles of time (the parts of which it consists), could possibly be distinguished from time.

With respect to the remainder of these definitions, (all but the first of the two which are ascribed to Aristotle,) in-

[a] Πυρρωνικαὶ Ὑποτυπώσεις. Lib. iii. xvii. De Tempore, pag. 161. § 136. (Fabricii, Lipsiæ 1718.) Cf. Stobæus, Eclogæ Physicæ, (Heeren, Gottingæ 1790,) lib. i. cap. ix. 40–45, tom. i. 248 sqq.

[b] Cf. Ibid. Adv. Physicos, ii. lib. x. 662, § 170. 663, § 176, 177. 669, § 216. 670, § 219. 673, § 244. 671, § 228, 229, 230.

somuch as each of them assumes time to be a species of motion (*κίνησις*) in general, they approach nearer to the truth; though they are both notwithstanding liable to the objection of not particularising the kind of motion which they mean in the sense of time: for it is not any kind of motion indiscriminately which is competent to constitute time. It is not the motion of the universe in general, except for the universe in general; but only that of parts of the universe, for parts of the universe in particular.

And as to the first of the two, attributed to Aristotle, that time is "the number of first and second or of prior and posterior in motion;" that is no definition of time itself, but simply of the order of its parts, and of the relation of one of them to another: for the parts of time are generated in succession, and the relation of first and second, of prior and posterior, is necessarily established among them by the law of the succession itself. A definition of time is found in Varro[c] (*motus et intervallum*) which had it specified more distinctly what kind of motion, and what kind of interval or suspension between motion and rest, was to be understood in such a case of the kind as this of time, would have been, in our opinion, the nearest to the truth of any which antiquity can furnish; and as concise and elegant as simple and satisfactory*.

* To the above definitions from Sextus Empiricus we may add the following from other quarters:—

Πυθαγόρας τὸν χρόνον τὴν σφαῖραν τοῦ περιέχοντος εἶναί (φησι). Πλάτων αἰῶνος εἰκόνα κινητὴν, ἢ διάστημα τῆς τοῦ κόσμου κινήσεως· Ἐρατοσθένης τὴν τοῦ ἡλίου πόρειαν[d].—*Πλάτων οὐσίαν χρόνου τὴν τοῦ οὐρανοῦ κίνησιν· οἱ πλείους τῶν Στωϊκῶν αὐτὴν τὴν κίνησιν· καὶ οἱ μὲν πλείους ἀγέννητον τὸν χρόνον, Πλάτων δὲ γεννητὸν κατ' ἐπίνοιαν*[e].—*Χρόνος δὲ ἀριθμὸς κινήσεως, κίνησις δὲ ἄνευ φυσικοῦ σώματος οὐκ ἔστιν*[f].—*Καὶ γὰρ αὐτὸς* (sc. *ὁ Ἀριστοτέλης*) *διακρίνει τὸν αἰῶνα καὶ τὸν χρόνον, καὶ τὸν μὲν ἀπονέμει τῷ νῷ, τὸν δὲ τῷ οὐρανῷ καὶ τῇ κινήσει τοῦ οὐρανοῦ*[g].—*Καὶ ὁ μὲν* (*Πλάτων*) *ἅμα τῇ οὐσίᾳ τοῦ οὐρανοῦ τὸν χρόνον ἀπεγέννησεν, ὁ δὲ* (*Ἀριστοτέλης*) *ἅμα τῇ κινήσει. τὸ γὰρ ἀριθμητὸν αὐτῆς εἶναι τὸν χρόνον*[h].—*Ἀριστοτέλης μὲν γὰρ τὸν χρόνον ἀριθμὸν τῆς κινήσεως θέμενος οὐ κατὰ τὸ ἀριθμοῦν ἀλλὰ κατὰ τὸ ἀριθμητὸν ἔθετο·*

[c] De Lingua Latina, *Biponti*, v. p. 52: Tempus esse dicunt intervallum mundi et motus.

[d] Plutarch, De Placitis Philosophorum, lib. i. *κά. περὶ χρόνου.*

[e] Ibid. *κβ. περὶ οὐσίας χρόνου.*

[f] Aristotle, De Cœlo, i. 9. p. 279. l. 14. (Bekkeri, Berolini 1831.)

[g] Proclus, in Timæum, (Schneideri, Vratislaviæ 1847,) B. (ii.) 183 = 77 F.

[h] Ibid. 212 = 90 D.

SECTION V.—*On the true idea of time, as we may collect it for ourselves.*

Dismissing therefore any further consideration of the ancient definitions of time, and without stopping to inquire into, and to compare with the ancient, the definitions of modern philosophers; let us endeavour to form for ourselves such a conception of time as may be deducible from simply acknowledged and indisputable principles; viz. from the agreement of this idea in some respects with that of duration, and from its disagreement with it in others: its agreement—as the *specific* must necessarily agree with the *generic* idea of the same thing; its disagreement—as even the *specific*

διὸ καὶ εἰκότως ἐζήτησε τί τὸ ἀριθμοῦν, εἴπερ ὁ χρόνος ἀριθμητόν[i].—Τοιαύτης δ' οὖν τῆς ζητήσεως οὔσης, Πλούταρχος μὲν καὶ Ἀττικὸς καὶ ἄλλοι πολλοὶ τῶν Πλατωνικῶν κατὰ χρόνον τὴν γένεσιν (τοῦ κόσμου) ἤκουσαν, καί φασι γίγνεσθαι τὴν ζήτησιν εἴτε ἀγένητος κατὰ χρόνον ὁ κόσμος εἴτε γενητός. εἶναι γὰρ πρὸ τῆς κοσμοποιΐας ἄτακτον κίνησιν, ἅμα δὲ κινήσει πάντως ἐστὶ καὶ χρόνος· ὥστε καὶ χρόνον εἶναι πρὸ τοῦ παντός. ἅμα δὲ τῷ παντὶ γεγονέναι χρόνον ἀριθμὸν ὄντα τῆς τοῦ παντὸς κινήσεως, ὡς ἐκεῖνος ἦν τῆς πρὸ τῆς κοσμοποιΐας οὔσης ἀτάκτου κινήσεως ἀριθμός[k].

Ὅτι ᾗ φησιν ὁ μέγας Πλάτων, ἡμέραι καὶ νύκτες μῆνές τε καὶ ἐνιαυτῶν περίοδοι χρόνον ἔδειξαν[l].—Φησὶ δ' ὡς ἐν ἀρχῇ ἐποίησεν ὁ θεὸς τὸν οὐρανὸν καὶ τὴν γῆν, τὴν ἀρχὴν παραλαμβάνων οὐχ ὡς οἴονταί τινες τὴν κατὰ χρόνον· χρόνος γὰρ οὐκ ἦν πρὸ κόσμου, ἀλλ' ἢ σὺν αὐτῷ γέγονεν, ἢ μετ' αὐτόν. ἐπειδὴ γὰρ διάστημα τῆς τοῦ οὐρανοῦ κινήσεώς ἐστιν ὁ χρόνος, προτέρα τοῦ κινουμένου κίνησις οὐκ ἂν γένοιτο, ἀλλ' ἀναγκαῖον αὐτὴν ἢ ὕστερον ἢ ἅμα συνίστασθαι. ἀναγκαῖον ἄρα καὶ τὸν χρόνον ἰσήλικα τοῦ κόσμου γεγονέναι ἢ νεώτερον ἐκείνου· πρεσβύτερον δ' ἀποφαίνεσθαι τολμᾶν ἀφιλόσοφον τῷ ὄντι[m].—Εὔηθες πάνυ τὸ οἴεσθαι ἓξ ἡμέραις ἢ καθόλου χρόνῳ κόσμον γεγονέναι, διότι σύμπας ὁ χρόνος ἡμερῶν καὶ νυκτῶν ἐστι διάστημα· καὶ ταῦτα ἡλίου κίνησις ὑπὲρ γῆν καὶ ὑπὸ γῆν ἰόντος ἐξ ἀναγκῆς ἀποτελεῖ· ἥλιος δὲ μέρος οὐρανοῦ γέγονεν· ὥστε χρόνον ἀνομολογεῖσθαι νεώτερον κόσμου. λέγοιτ' ἂν οὖν ὀρθῶς ὅτι οὐκ ἐν χρόνῳ γέγονε κόσμος, ἀλλὰ διὰ κόσμου συνέστηκε χρόνος. ἡ γὰρ οὐρανοῦ κίνησις χρόνου φύσιν ἔδειξεν[n].

A dextra lævaque dies et mensis et anni,
Sæculaque, et positæ spatiis æqualibus horæ &c.

Ovid. Metam. ii. 25. Description of the palace of the sun.

[i] Proclus, In Timæum, Δ (iv) 583, 584 = 241 A. B.

[k] Ibid. B (ii) 199 = 84 F, 85 A.

[l] Philo Judæus, ii. 502. 20. De Mundi incorruptibilitate. (Mangey, 1742.)

[m] Ibid. i. 5. l. 45. De Mundi Opificio.

[n] Ibid. i. 44. l. 1. SS. Legg. Allegoriæ, I.

or *individual* idea of a certain thing must necessarily, and to some extent, differ from the *generic*.

It is evident then from what has already been shewn, that the notion of *continuance* must enter into the conception of time; for continuance is the most abstract and simple idea which we can form to ourselves of duration itself. Continuance, separated from all the particular relations which are mixed up with it, is duration: and time could possess no part nor degree of the essence of duration, did it not share in this property of continuance peculiar to it.

But to duration it is essential to be continuance *without* beginning and *without* end. To time therefore it must be essential to be continuance *with* a beginning and also *with* an end. If it is certain that duration, as contradistinguished to time, never could have had a beginning; it must be equally certain that time, as opposed to duration, must have had a beginning. Origination therefore, on the one hand, is necessary to time, and termination, on the other, is so too; whereas neither origination nor termination is compatible with the essence of duration.

The ancients are sometimes found reasoning to the contrary of this very obvious distinction: but they are generally in such cases guilty of a fallacy, which it is easy to detect; viz. that of using the word time in a double and consequently an ambiguous sense. Non enim, says Cicero[o], si mundus nullus erat, sæcula non erant. sæcula nunc dico non ea quæ dierum noctiumque numero annuis cursibus conficiuntur: nam fateor ea sine mundi conversione effici non potuisse. sed fuit quædam ab infinito tempore æternitas, quam nulla temporum circumscriptio metiebatur; spatio tamen qualis ea fuerit intelligi potest: quod ne in cogitationem quidem cadit ut fuerit tempus aliquod nullum cum tempus esset. *Εἰ γὰρ πεπέρασται ὁ χρόνος, ἦν ποτε χρόνος ὅτε ὁ χρόνος οὐκ ἦν· καὶ ἔσται ποτὲ χρόνος ὅτε οὐκ ἔσται χρόνος. ἄτοπον δέ γε ἢ τὸ γεγονέναι ποτὲ χρόνον ὅτε ὁ χρόνος οὐκ ἦν, ἢ τὸ ἔσεσθαί ποτε χρόνον ὅτε χρόνος οὐκ ἔσται*[p]. But there is really no contradiction between even two such propositions as these, if we are careful to distinguish what

o De Natura Deorum, i. 9, 21.
p Sextus Empiricus, Adv. Physicos, ii. lib. x, 665. § 189.

we mean by time in one of these senses, and what we mean by it in the other. It may be alike true to say, There must have been a *time* (i. e. a determinate point or period in duration) when there was no *time*, there was nothing, as yet, which constitutes time at present, none of the measures of time ; or to say, That there will or there may be a *time* (a fixed term, a period in duration) when there will be, or there may be no *time;* nothing any longer which constitutes time at present; none of the measures or component parts of time, as they existed, and as they went on, and were generated perpetually, until then[q].

We return then to our first position, that origination is necessary to time; and yet that termination is necessary too. Without origination, there never could have been any such modification of duration, differing from simple duration, as time; and without termination, no mode of duration, even different from duration itself, once originated, could continue to differ from it. And when we have specified these two conditions of the being and continuance of time, we have designated every thing which is really characteristic of time, as opposed to duration. For we can actually form no other adequate idea of time, in its most general and yet its most specific and most limited capacity, but that of duration periodically stopping yet never ceasing; always coming to an end yet always beginning again; perpetually interrupted yet never absolutely terminated. And this, no doubt, must have been what the ancients intended, when they defined time, Μέτρον κινήσεως καὶ μονῆς—Motus et intervallum. Any further distinction, (as according to what law, or to what measure of the interval between origination and termination in such a case, between alternate motion and alternate rest, this effect was to be supposed to go on and to be repeated perpetually, provided it was stated and regular,) in comparison of this general and only indispensable condition of the process, might appear to be indifferent to the effect itself; and so far to be merely accidental.

To go on or proceed perpetually is essential to time; yet

[q] Macrobius reasons more justly: Ex quo intelligi volunt, cum Chaos esset, tempora non fuisse. si quidem tempus est certa dimensio quæ ex cœli conversione colligitur. tempus cœpit inde. Saturnalia, *Biponti*, i. viii. 235.

to stop is equally so. Motion is indispensable to time; yet suspension of motion is indispensable too. Continuity is necessary to it; yet interruption is so likewise: whereas pure and simple duration is incapable of any such contrary affections of its being. It is a necessary property of time to consist of parts, and to be divisible: but though we are often obliged to speak even of duration, as if that too were composed of parts distinct from one another and capable of being separately regarded, (and therefore as if it were divisible also,) in strictness it is not susceptible of division; nor can any one part of duration be separated even in imagination from the rest, so as to leave less of duration than before: no more than any one part or segment can be detached from space, so as to leave less of extension than before. The parts of duration at least, like those of space, must be coexistent; and at rest among themselves: the parts of time must be successively generated; and though some of them may seem to be already fixed like those of duration, others must still be in motion; and they can never be all simultaneous, and coexistent at once. Nor in reality can the parts of time under any circumstances be so fixed like those of duration, but that they may always be considered moveable, and any one of them capable of being detached from the rest.

It is essential to duration to be infinite, to time to be finite, first in the parts of which it is composed, and secondly in the sum total or aggregate of those parts themselves; for this never can be infinite, no more than the parts of which it consists; though both they and it may be capable of any degree of finite magnitude. Finally, regularity is essential to time, but cannot be predicated of duration. Regular order, regular succession, regular interruption, regular renewal of one and the same course of things, is the very thing meant by time; whereas even order and succession are excluded from the idea of duration, as something which is pure and simple continuance, flowing on perpetually in the same unbroken and unvaried tenor. And if regularity is essential to time, equality or equability must be so too: for the operation of a regular law or rule of any kind must be uniform; the effect of one and the same cause, under the

same conditions and circumstances of its agency, must be the same. The parts of time then, successively generated according to one and the same law of the succession, must be equal one to another, and identical in every thing but the order of their being itself.

The resulting idea of time then, derivable from these several considerations laid together, the most complete perhaps and comprehensive which we can form for ourselves, (sufficiently so at least to answer the purpose which we have in view at present,) may be summed up and stated as follow :—

That time is a mode of duration, so constituted and so characterised in contradistinction to duration itself, as always to be beginning and always to be ending; always continuing yet always suspended: only at regular intervals and after a regular manner. It is duration made up of finite parts successively generated and brought into being according to one and the same law, and in the same order; each of which is equal to each, but each is numerically distinct from each. It is duration composed of parts so generated and so assimilated one to another perpetually, that there is no other criterion, nor possibility of a criterion, to distinguish and discriminate them asunder, but the order of generation itself; the order of first and last in one and the same succession: which as we have seen is the notion of time intended to be conveyed by the definition thereof, ascribed to Aristotle in particular.

As to the divisions of time into past, present, and future; so far as this general idea of it is concerned, they may be considered accidental. In reality, there is no division of time except into the past and the present. Future time as yet is an absolute nonentity, though not an impossibility: and as to the distinction of past time and present, (*τὸ γεγονὸς* and *τὸ ἐνεστὸς* or *τὸ νῦν*,) it is this; That past time is perfect of its kind, but it has ceased to be; present time is in being, but it is not yet perfect of its kind. In a popular argument like this there is no necessity why we should restrict ourselves to metaphysical niceties either of thinking or of speaking: and therefore we will take the liberty of assuming that the present is time in the act and

process of being generated, and consequently not yet complete of its kind; though in reality it is complete in its degree as much as the past, the moment it has begun to be; and in fact it is no longer present, but already added to the past: the past is time which has been generated, and therefore is now perfect of its kind and complete. Perfected or past time defines the comprehension or extent of time up to a certain point, by defining and limiting the sum of its parts, so generated successively and so added one to another, up to that point; present or passing time enlarges this comprehension and adds to this extent perpetually by continually adding to these parts. The past too is necessary; for past time can never be other, neither in the parts nor in the sum total, than what it has once become: the present participates in the contingency of the future, to which it is just as much related as to the past. For time is not, (like duration,) in its own nature incapable of coming to an end, but may cease at any moment, and for ever: and were such a contingency to happen, it must be *ἐν τῷ νῦν*. The present and the future would be affected by it; but not the past.

SECTION VI.—*On the Cause of time. The Cause of time distinct from that of duration.*

The above definition (or rather description) of time throws no light on the further question of the causation of time; or what that is which makes and determines time, in the sense thus explained, as a different thing from duration; or what is the cause of the simple resulting effect so defined or described, distinct from the effect itself? Into this question then must we now proceed to inquire.

And here we may naturally begin with observing that though the very idea of time is ultimately derivable from that of duration, and though time itself is merely a particular form of duration; yet for this very reason that duration is the *simple*, time is the *complex* idea of the same thing, that duration is the *prior*, and time is the *secondary* form of the same kind of existence, in general; we are excused from the necessity of inquiring into the cause of duration, in order to discover the cause of time. For according to the supposition on which we set out, duration is not only differ-

ent *from* but prior *to* time : duration has a being of its own, anterior to and independent of time. Time itself is a modification of duration ; and all we have to do, in order to ascertain the cause or causes of time, is to discover the cause or causes of that modification. But the cause or causes of particular modes or forms of a certain thing are not necessarily the cause or causes of that thing itself: or rather the cause or causes, which make a certain thing different from itself, cannot possibly be the cause or causes which make it what it is.

As to duration, which by hypothesis is a form of the same thing not only prior to time but unoriginated, unchangeable, and eternal also ; to inquire into the cause or causes of such an effect as that might be possible in itself or not ; but it would evidently be beyond and beside our purpose at present. God must understand what it is which makes duration, which constitutes eternity ; if there be any thing capable of accounting for such an effect except his own Being and his own Eternity itself: but whether man could or could not, at least in his present state, would be another question. Happily, we are spared the necessity of attempting to solve a problem, which reason and common sense would concur to pronounce to be impossible. Time is duration indeed, but brought down to the level of the human capacity, and placed within the compass and reach of the human apprehension. We can comprehend even duration in the form of time. The question with which *we* are concerned is that of the origin of time : and this is one which we are competent to solve.

SECTION VII.—*Ancient division of causes, and its applicability to the present question. On the Material cause of time.*

The ancient division of the causes of things into Material, Instrumental, Formal, Efficient, and Final, has been discarded by modern philosophers, and does not enter into the received distinctions in metaphysics at present. We should notwithstanding be doing injustice to the most acute and sagacious intellects not only of former times but of any times, were we to infer from this fact that such divisions

were not founded in the nature of things; or that the philosophers of old were making distinctions without a difference, and using words without meaning, when they began with laying down such divisions; and adapted their language and their reasonings accordingly. At any rate, if even this seemingly antiquated division of causes is calculated to facilitate our own inquiries at present, and to give us clearer ideas on so subtle and abstract and obscure a subject as this of time, there is no reason why we should not revive it for our particular purpose, and apply it to the question which we are about to consider, that of the cause or causes of time.

First then, with regard to the Material cause of time; There is no such thing, nor in the nature of things can there be: because Time itself is not a substance, or a material thing. The material cause of a production of any kind is the ὕλη or substance out of which it is made: and every material production has such a material cause. The stones, the bricks, the cement, the timbers of which a building consists, are the material cause of the building. In this sense, there can be no such thing as a material cause of time: though among the opinions enumerated by Sextus Empiricus there was one, attributed to Ænesidemus, (a philosopher of whom little or nothing is known,) which appears to have assigned a substantial nature even to time itself; at least to have made time the primary element of the matter of which every thing else consists. This opinion was probably founded on the observation That all substance, which has an actual existence, exists in time: from which it might be inferred, at first sight, that time itself was an element which entered at bottom into the composition of matter and substance, in every form and shape.

It can scarcely be necessary at present to refute such an opinion as this. No one is likely now to maintain that duration itself is material or substantial, though all matter and substance, which has an actual existence, exists in duration; nor that space itself is material or substantial, though all matter and substance which is finite, and cannot be every where extended and every where present at once, is locally bounded by space. Neither then can time, which is only

a mode of duration, be matter or substance; nor place, which is merely a modification of space, be material or substantial.

SECTION VIII.—*On the Instrumental cause of Time.*

Secondly, with regard to the Instrumental cause of time; If we are not to extend the proper notion of time to any conceivable affection of duration; if any imaginable interval or succession of intervals, howsoever marked or discriminated asunder, is not to be considered competent to constitute what we mean by time and by the distinctions and divisions of time; if the name and the idea of time are both to be restricted to such modifications and measures of duration as have their foundation in nature, and are recognised every where by the common sense and common agreement of mankind: there are three instrumental causes of time and no more; and each of these is a natural one: 1. The motion of the earth about its own axis or its own centre: 2. The motion of the moon about the earth: 3. The motion of the earth about the sun.

These three are the only motions in nature, really concerned in the causation of time, (and that too instrumentally,) with which mankind are acquainted: or, to express this proposition somewhat differently; There is nothing in nature, to which men have agreed or could with propriety have agreed to give the name of time; nothing, with which they are sensibly and experimentally conversant every where in the shape of time; which is not the effect of one or other of these three motions, as its instrumental cause.

There may be other motions *in rerum natura*, which may subserve to the constant production of such an effect as time: but if there are, either they are as yet entirely unknown to mankind, or they do not in the least degree concern mankind; they do not affect their particular place in their own system, or their own relation to this system, or that of this system to them. Astronomers maintain that they discover the indications of such other natural movements, far beyond the limits of their own system; and that these become more and more general, and more and more comprehensive of their kind, the further research and inquiry is extended into

the universe of space*. Nor is there any difficulty in believing that the actual state of the case both may be, and probably is, as they declare: that as satellites and secondaries in our own system revolve round their primary planets, and planets and satellites in conjunction revolve round our sun; so the sun of this system with the system of which it is the centre, and other suns with their subordinate systems, may revolve round other centres: and ultimately every thing, even the universe of matter itself, may be found revolving about some grand and all-absorbing centre of attraction, which for ought that human science can discover to the contrary may be the throne of God; to which Homer himself, as the classical reader well knows, attached universal nature and all its dependencies by a golden, indissoluble chain. There may consequently be time, (i. e. distinctions and measures of duration, the effect of these different

* Cosmos of Baron Humboldt, translated by Captn. Sabine, i. 134: "Altogether distinct in its nature is the movement of translation of the sun, the progressive motion of the centre of gravity of the whole solar system in universal space; which is supposed to take place with such prodigious velocity, that according to Bessel the relative motion of the sun and the star 61 Cygni amounts in a single day to no less than 3,336,000 miles."

Ibid. "After deducting all that depends on the precession of the equinoxes, and the nutation of the earth's axis;.. all that results from the propagation and aberration of light, or from the parallax produced by the opposite positions of the earth in its orbit round the sun; we find a residual annual motion of the fixed stars, which includes both the translation of the whole solar system in space, and the actual proper motions of the stars themselves."

Ibid. i. 135: "The sun is moving towards the constellation of Hercules; and very probably towards a point, which from a combination of the observations of 537 stars was situated (equinox of 1792·5) in 257°. 49′. 7″. Right Asc.—and in 28°. 49′. 7″. N. Declination; (or in 259°. 9′. AR. 34°. 36′. Declination." Cf. note 102. p. xxxvii.)

Since the publication of this work, an hypothesis has been announced by Professor Mädler of Dorpat, that the true centre of the sidereal universe is situated in the constellation Pleiades, and that the central sun itself is probably the star Alcyone of that constellation, *Eta* Tauri. Professor Mädler's own theory on this subject has been laid before the astronomical world, in an essay entitled "Der Central Sonne." Dorpat, 1846. It would be premature to call this a discovery; and astronomers, as yet, seem to be far from acquiescing in his hypothesis. See Outlines of Astronomy, by Sir John Herschel, ch. xvi. § 861. p. 589. London, 1849.

motions,) as truly and properly so called in contradistinction to duration, as any thing of the same kind with which men are most familiar on earth. It may be not merely in the language of analogy, or of accommodation to human ideas, that inspiration itself speaks of the days of heaven[r], or gives us reason to conclude[s] that even in heaven as well as on earth the lapse of time is measured and numbered by days of some kind or other.

But still the fact holds good as we have asserted; That there are no motions in nature known to ourselves or with which we ourselves are concerned, instrumental to the production of what is every where called time, and is every where understood by that term, except these three. The rest of the planets, which belong to the same solar system as the earth, revolve about their own axes as well as the earth: several of them have moons revolving about them, as well as the earth: and all revolve round the sun in common with the earth. Yet what are their motions, or the proper effects of their motions, to us? or what have those other planetary measures of time to do with our own? Men have done various things, (especially in former times,) to establish a connection, which nature itself had not established, between their own earth and the rest of the system of which it made a part. They have given planetary names to the cycle of their own week, which are still retained; and they have given planetary names, before now, to the cycle of their own year[t]; for thus much it was always in their power to do: but no nation was ever so foolish as to go to Venus or to Jupiter, or to any other of the planets, for the cycle of the week or the cycle of the year itself. No civil calendar, either in ancient or in modern times, has ever been regulated except by the moon or by the earth.

SECTION IX.—*On the Formal cause of time.*

Thirdly, with regard to the Formal cause of time; It is the nature and effect of this principle of causation to superinduce on that which the instrumental has produced, or in the act and process of producing it, and by the mode of the

[r] Ps. lxxxix. 29: cf. lxxii. 5. Deut. xi. 21. [s] Job i. 6. ii. 1.
[t] Daunou, tome iii. Leç. viii. p. 284.

production itself, to communicate to it the specific, distinctive, individuating, (in one word, *formal*) characteristic, whereby one particular production or effect of a certain kind is discriminated from another of the same kind also.

Now the formal cause of time, so understood, is and must be the *law* of the motion which produces the effect which we call time. And as there are three motions of that kind, each of which is concerned instrumentally in the production of such an effect, so there will be three formal causes of time in this sense. For each of these motions has its proper law, to rule and direct itself in the process of producing the effect; as well as its proper effect which it is the instrument in producing: and as the motion which thus produces the effect is its instrumental cause, so the law which thus regulates and controls the motion is its formal cause. Neither these motions, nor the laws which regulate them, are the same in each case; nor is the effect of both the same in each, though we give it in all the common name of time. Each motion then being different from the other two, and each being instrumental to a different effect, yet each being governed and directed and kept in being by a law of its own perpetually; if there are three natural motions, *mediately* concerned in the production of time, but no more, there will be three instrumental causes of time, but no more: and if there are three natural laws, (one of which regulates one of these motions and determines it perpetually to the production of its proper effect,) but no more; there will be three formal causes of time also, but no more.

The joint effect of this instrumental and of this formal cause, in the case of the first of these productions, is that measure of time which we call *day* and *night*, or *night* and *day*: the joint effect of both, in that of the second, is the measure of time which we call the *month*: the joint effect of both, in the case of the third, is that which we call the *year*. Besides *these three* measures, so produced, there are no more in nature which are really distinct; because there are no more motions in nature, which are really concerned (either instrumentally or formally) in such productions; or none of which *we* can be supposed to know any thing; none at least with which *we* can be supposed to have any connection at

present. And this has been the observation and conclusion of all antiquity: *Φασὶ γὰρ οἱ παλαιοὶ ὅτι τρεῖς εἰσι χρόνοι, δι' ὧν ὁ πᾶς αἰὼν ἀριθμεῖται, ἡμέρα, μὴν, ἐνιαυτός. ὧν ἡμέρα μὲν οὐρανοῦ ἐστιν ἀποκατάστασις, ὁ δὲ μὴν σελήνης, ὁ δὲ ἐνιαυτὸς ἡλίου*[u].

Now these different effects, as something distinct from duration yet partaking of the essence of duration, answer to all those characteristics and criteria of time, as the same with duration in some things yet different from it in others, which we began with ascertaining and laying down. They are forms and modes of duration agreeing with duration itself while they exist; parts and segments of duration which differ in no respect from duration itself as far as they go. But they are forms and modes of duration always beginning and always ending; always interrupted yet always renewed; distinguishable from duration in the effect or result of the process, not distinguishable in the mode of the process itself. They are made up of parts successively generated after an invariable order and according to a regular and invariable law; consequently of parts which are finite in themselves, yet equal to one another and incapable of any distinction individually but that of order or number. Nor, among these characteristic distinctions, does any require further or more particular explanation, to clear up its application to each of these cases, except perhaps that which implies the supposition of a constantly ending yet constantly renewed effect; of something, in each instance, which continually approaches to the point of termination without ever being actually discontinued.

Might we be permitted to invent a word, which, without offending against propriety in any other respect, would be the best adapted to express this particular property of time, (the principal thing to discriminate it from duration itself,) it would be some such term as Periodicity; provided that, by periodicity, were to be understood motion or succession of an uniform kind and according to a regular law, which at stated intervals came to an end, and yet was immediately

[u] Eustathius, ad Iliad B. 308. tom. i. 183=226. l. 45. (Lipsiæ 1827.) Taken from the Scholiast on Homer, Iliad B. 328: *ἔτεα: τρεῖς εἰσιν οἱ χρόνοι δι' ὧν ὁ πᾶς αἰὼν ἀριθμεῖται, ἡμέρα, μὴν, ἐνιαυτός. καὶ ἡ μὲν ἡμέρα οὐρανοῦ ἐστιν ἀποκατάστασις, ὁ δὲ μὴν σελήνης, ὁ δὲ ἐνιαυτὸς τοῦ ἡλίου.* Ex recensione Immanuelis Bekkeri, Berolini, 1825.

renewed in the same manner and according to the same law as before. Periodicity, in this sense, must be a common property of all finite motions, which are uniform, constant, and equable, and yet continuous. One such motion must have come to an end before another of the same kind can possibly have begun: yet, from the nature of the motion itself, one will no sooner have come to an end than another of the same kind will immediately have begun*.

Thus the earth is perpetually revolving about its own centre, and the moon about the earth, and both about the sun; and each with a motion which is absolutely uniform and invariable, or may be assumed to be so. Each revolution therefore, and of every kind, is finite and complete in itself: each is the same with every other of its proper kind: each is and must be over, before another of the same kind begins or can possibly have begun: each therefore is perpetually coming to an end, yet each is perpetually continued; and there is no actual interruption in the series and succession of such motions, not even for a moment.

* This property of an ever fleeting and transient but never interrupted succession, like that of time, (a series of stoppings and reiterations in the same course of things,) which we thus propose to call periodicity, being the most remarkable and most characteristic of all its peculiarities; it is that on which, more than on any other, the poets are found to insist in their descriptions of time, and of the phenomena exhibited by it; that property, by virtue of which it is always reproducing itself, and while it never actually stands still, it seems to be constantly ending and constantly beginning again in the same way.

Περὶ τούτων οἶμαι καὶ ἡ τραγῳδία φυσιολογοῦσά φησιν,

Ἀκάμας τε χρόνος περί γ' ἀενάῳ
ῥεύματι πλήρης φοιτᾷ, τίκτων
αὐτὸς ἑαυτόν.

Clemens Alex. Strom. v. cap. vi. § 37. p. 27. l. 19. Ex editione Klotz. Lipsiæ, 1831. A fragment of the Pirithöus of Euripides. Cf. Dindorf. Fragm. iii.

Ipsa quoque adsiduo labuntur tempora motu
Non secus ac flumen. neque enim consistere flumen
Nec levis hora potest: sed ut unda impellitur unda,
Urgeturque prior venienti, urgetque priorem,
Tempora sic fugiunt pariter pariterque sequuntur,
Et nova sunt semper. nam quod fuit ante relictum est,
Fitque quod haud fuerat: momentaque cuncta novantur.

Ovid. Metam. xv. 179.

That there must be then an actual point of termination between any two consecutive motions of any of these three kinds, (a point, at which one must end before another of the same kind can begin, a point, which must really exist and really answer this purpose, whether we can define it and make it sensible to ourselves or not,) there cannot, or ought not to, be any doubt. In one of these cases, this absolute natural terminator is the return of the same fixed point, or line of points, on the surface of the earth, which astronomers call a meridian, to the same state of relation to something else, with which we suppose it to be constantly compared, (either the sun or a star, and either the mean or the actual sun,) after that interval of time which is called a nightday or nychthemeron. In the second, it is the return of the moon to the same line of conjunction with the earth and the sun, or to the same line of opposition to the earth and the sun, from which it is supposed to have once set out, after the interval of time which constitutes the measure of one revolution from conjunction to conjunction, or from opposition to opposition. In the third, it is the return of the earth to a given point of the ecliptic, (whatsoever that may be assumed to be,) after the interval of time which constitutes the length of the sidereal or the tropical year, and measures the absolute duration of one entire revolution of the earth all round its orbit, from a given point of the ecliptic to the same again. And that these several intervals too, in themselves, are constant and uniform, and have a mean, as well as an actual measure respectively, the former of which is comparatively invariable, whatsoever the latter may be; that they are consequently equal one to another, and each of them finite and complete in itself, yet that they are never interrupted, never suspended; that they are constantly coming to an end, yet constantly beginning again in the same way; is just as evident, or may reasonably be taken for granted as something allowed upon all hands.

It may be objected indeed that this true physical terminator or point of discrimination between consecutive motions of the same kind, in each of these instances, cannot be made obvious to sense: and that may be very true; and yet it ought to occasion no difficulty. It is sufficient that

such a terminator must be admitted; and that it may be conceived. And yet there is in reality even a physical and sensible distinction of this kind, as well as a latent and metaphysical one; which, as far as concerns the evidence and the perception of continued and uninterrupted identity, and yet of alternate cessation and reiteration, in one and the same course and succession of things, serves the purpose of discrimination just as well. The alternation of light and darkness, the appearance of the sun in the same quarter, or nearly the same quarter, of the heavens in the east, and its disappearance in the same or nearly the same in the west, at stated distances of time asunder perpetually; are sensible proofs, every where visible and every where intelligible, that the same succession of day and night is continually coming to an end, yet is constantly beginning anew, and is never for a moment suspended or interrupted. The variations discoverable in the face or external appearance of the moon; its visible returns to the same quarter in the west, or to the same in the east, relatively to the sun, at stated and similar intervals of time perpetually; intimate even to the senses that the course and succession of months, once begun, is ever in the act of being completed, yet ever in the act of being renewed. And finally, the cycle of the seasons, the several phenomena of spring and summer and autumn and winter, recurring each in its turn, in a regular order and at regular intervals, every where; besides the appearances peculiar to the heavens, in the risings and settings of the fixed stars at stated points and periods of every revolution of the earth about the sun; are just as intelligible an indication to the eyes of an observant spectator, that the great cycle of the year too is both perpetually in the act of being terminated, and perpetually going on, as if it never was, nor could be, for a moment interrupted.

Nor are there any natural motions which are complete and entire in themselves, yet distinct from and independent of each other, but these three: nor consequently are there any measures of time, which also are complete and entire in themselves, yet different from every thing else of the same kind, but those which are founded on these three motions. There is no *one natural* division of time less than

the day and the night: nor any *one natural* division *greater* than the year. Divisions of these different measures themselves are possible; because any whole, which is not of the nature of a monad, an unit or integer, must admit of being resolved into a certain number of component parts. And in point of fact lesser distinctions of time, so obtained from these greater ones, are to be met with every where; subdivisions of day and night, called morning and noon and evening and midnight; and even much smaller ones than these, (but still only parts of the same thing,) such as hours and minutes and seconds and thirds. The parts of one and the same moon, or month, always have been, and still are, distinguishable by the different phases or appearances of the moon itself, in the course of one and the same revolution about the earth; the first phasis and the last, the first dichotomy, the second dichotomy, and the full. The year in like manner is every where divisible, and has every where actually been divided, into the spring the summer the autumn and the winter, according to the different phenomena of nature in the constantly recurring cycle of production and decay. And among the ancients in particular, (as the calendars, which still exist, bear witness,) it was often distributed into as many as *seven* parts or periods, discriminated asunder by the appearance or disappearance of certain stars at such and such seasons of the year; or by the blowing of certain winds; or by the return of certain birds; or the like. But no such distinctions as these amount to the introduction of any fresh natural measure of time. They are all merely arbitrary and positive modes of dividing and subdividing, for various uses and purposes, the pre-existing measures of nature.

Nor do these natural measures cease to be distinct from and independent of each other, because they are found to run one into another: nor do they lose their own individuality by being blended together, and incorporated with each other. A lesser measure of a certain kind must enter a greater of the same kind:—(must be capable, at least, of doing so:)—the month must admit of being measured, more or less completely, by the day and the night, and the year by both. The ultimate element of time, in all its natural measures, is the cycle of day and night. And yet, even

under such circumstances, the matter of fact still holds good; that no one natural measure is exactly commensurable to another, and no one can actually be measured by another. The natural year is not reducible to the standard of the natural month, nor the natural month to that of the day and the night: and approximate one to another as nearly as they may, in each of these cases a difference still remains, which serves as the index of an inherent and intrinsic anomaly, inseparable from the being and constitution of each; an anomaly ordained by nature itself, as an insuperable bar to their ever and under any circumstances becoming absolutely the same, and so far losing their individual character and distinctness by passing one into another.

Section X.—*On the Efficient cause of time.*

The Efficient cause of a certain effect is that which gives the power of causation to every thing else concerned in the same effect. It is that which communicates to the material subject of the production the passive susceptibility of form and shape; to the instrumental agency the ability to serve as the means of eliciting such forms and such shapes from matter and substance; to the formal the plastic or fashioning energy, which directs the instrumental and moulds the material cause. It is the cause of causes: the presiding, enforcing, and actuating principle of the whole result. What then is the efficient cause of time?

No doubt, if the scriptural account of the origin of the present system of things, (of which the actual measures of time are an actual part,) is true; it was the *will* and the *word* of the common Creator of all and of every part of this system. It was that *will* and that *word*, which gave those motions at first to each of these bodies, the earth and the moon, by virtue whereof they became both the instrumental and the formal causes of time. It is the same will once exerted and never yet changed, and the same word once pronounced and never yet recalled, which keeps those motions still in being, subject to the laws impressed upon them at first; and thereby still provides for the same course and succession of things, which we call time, as ever, and according

to the same measures and distinctions, as at first. On this subject however we may possibly find a more convenient opportunity of enlarging hereafter.

Section XI.—*On the Final cause of time.*

The final cause of a particular production, in the ancient acceptation of these terms and of these distinctions, was the *final end* of the production itself: and this final end was supposed to be declared in general by the *effect* which was observed to follow *upon* the production; by the purpose to which it was seen to be subservient; by the use to which it was put. What then is the final end, (for that will be the final cause,) of time?

The answer to this question must be found in the matter of fact: viz. That every thing, which has existed since the beginning of the present system of things, or does exist, or ever will exist while this system itself lasts, has had its being, still has its being, and will yet have its being, in *time*. Every thing which ever did happen, or still happens, or will yet happen, whether in the natural or in the moral world, while both continue the same; has happened, and is still happening, and will yet happen, in time. All generation, corruption, and transformation, all resolution and recomposition in the processes and operations of nature, go on in time. All human actions and all historical events have come to pass, and do still come to pass, in time. Individuals are multiplied into families, families into communities, communities into nations, in time. Cities are built, empires are founded and reared, wars are waged, battles are fought and conquests are made, in time. Kingdom succeeds to kingdom and dynasty to dynasty, in time. The progress of civilisation, the gradual advancement of refinement, the inventions of art, the discoveries of science, are the work and effect of time. The achievements and triumphs of genius, of every kind and in every way, poetry, painting, sculpture, music, and architecture; whatsoever is calculated to humanize and polish, to adorn and embellish society, is contemplated, conceived, and attempted, is consummated and perfected, in time: and for a time it flourishes and attracts admiration, it is studied and emulated; and in time

it declines, it sinks into decay, it perishes and is forgotten. Individuals are connected with one and the same system, of which each forms in his turn the same integral and equally essential part, by their order of time in relation to it; by their time to be born, their time to live, and their time to die[z]: and in this manner the system itself is continued, while its individual parts are constantly terminated; like some great and abiding drama, the actors in which or dramatis personæ are always new, but the action itself still goes on, the stage remains, and the scene is never shifted. Race has succeeded to race and generation to generation*, yet all is in the same course of coming to an end, and of beginning again, as at first. Old things are seemingly passing away, and yet nothing is absolutely new. The same cycle of alternation and change, of antiquation and renovation, of transition and restitution, is perpetually circulating round and round: but so is time. Every thing both in nature and in the world of human agency is in a constant flux and succession: and so likewise is time. Every thing in short is comprehended and circumscribed by time; and time itself by duration.

* *Οὐδὲν ἐν ἀνθρώποισι μένει χρῆμ' ἔμπεδον αἰεί·*
ἓν δὲ τὸ κάλλιστον Χῖος ἔειπεν ἀνήρ·
Οἵη περ φύλλων γενεὴ τοιήδε καὶ ἀνδρῶν.

Poetæ Minores Græci (Gaisfordii, 1834) Simonides. C.

Οἵη περ φύλλων γενεὴ τοιήδε καὶ ἀνδρῶν.
φύλλα τὰ μέν τ' ἄνεμος χαμάδις χέει, ἄλλα δέ θ' ὕλη
τηλεθόωσα φύει, ἔαρος δ' ἐπιγίγνεται ὥρῃ·
ὣς ἀνδρῶν γενεὴ ἡ μὲν φύει ἡ δ' ἀπολήγει.

Iliad. Z. 146.

As of the green leaves on a thick tree some fall and some grow; so is the generation of flesh and blood: one cometh to an end and another is born.—Ecclesiasticus xiv. 18.

Νύμφα φίλη τί με τόσσον ἀνείρεαι αἷμα γενέθλης;
ὠκυμόρων μερόπων γενεὴν φύλλοισιν ἐΐσκω·
φύλλα τὰ μὲν κατέχευαν ἐπὶ χθονὶ θυιάδες αὖραι
ὥρης ἱσταμένης φθινοπωρίδος, ἄλλα δὲ καιρῷ
εἰαρινῷ κομέουσι τεθηλότα δενδράδες ὕλαι·
ὣς βροτέη γενεὴ μινυώριος ——

Nonnus, Dionysiaca, iii. 248.

z Cf. Ecclesiastes iii. 1—8.

Now that all this might be the actual state of the case, (at least in connection with the present system and scheme of things,) it is on every account to be supposed must have been the *final* end of time: and therefore this constitution of things itself, and this effect, must so far be the *final* cause of time.

SECTION XII.—*On the connection of time with the events which come to pass in time: whether necessary or contingent.*

But here the question naturally presents itself, Whether this constitution of things itself, and this connection of time with every thing which either has come to pass, or is still coming to pass, in time, is necessary or accidental? In answer to which we may reason as follows.

First, all events which either have happened, or still do happen, or may be considered capable of yet happening, on the face of the earth, constituted as it always has been and still is at present, being supposed to be divisible into two comprehensive classes, the physical and the moral; the physical, those of which nature and the laws of nature are the producing cause, the moral, those which are more or less directly, and more or less exclusively, the work and doing of man: the connection of time with each of these classes respectively may not be the same; physical events, explained and limited as above, being one thing, and moral effects and human actions being another.

To consider then briefly the relation of time to each: and first, to the great and comprehensive class of moral events in general. The connection of time with events of this description, *before they happen*, is accidental and contingent. Great confusion as well of language as of ideas, on the subject of this connection, may indeed be observed to prevail both in books and in common discourse: yet a little reflection will satisfy us, that the case *is* as we have just asserted it to be: that there is no *necessary* connection between time and any moral event which happens in time, until it *has happened* at least. There is no such necessary connection as that of cause and effect, or even of antecedent and consequent, in the ordinary sense of cause and effect.

Every moral event may, (or rather must,) happen in time; and yet no moral event whatsoever can be considered, in strictness, the work or effect of time.

It is a conceivable case, that time might have gone on, from the first, exactly as it has done down to the present day; and yet nothing, in the shape of a moral event defined as above, which has actually happened since the beginning of things, actually have come to pass. No Christian can doubt of this, who reads in his Bible of a state of things anterior to the fall of man, very different from that which has existed *de facto* since the fall; yet not older than time, much less than the creation itself: a state too intended at first to have been lasting yet not to have been measured, in point of duration, in any manner differently from that system which has actually existed all along in its stead. And the reverse of this proposition is just as conceivable; That every thing which has actually come to pass on the face of the earth, since the earth and its present inhabitants both came into existence together, might have come to pass exactly *as* it has, and exactly *where* it has, and yet no such thing as time have had any existence; that is, as time in its present state; as that particular form and modification of duration which has actually existed along with the present state of things, and has actually accompanied it from first to last.

These two cases, we say, however opposed to one another, are both conceivable. No one can deny the equal possibility of either in the abstract and *a priori*. They must be demonstrative therefore, that there is no necessary connection between time and the events which have happened, or are still liable to happen, in time, (even the moral, and those in which men themselves are most concerned,) at least *before* they happen; that moral events do not originate in time, as effects of every kind do in their proper causes; that time is neither the *material*, nor the *instrumental*, nor the *formal*, nor the *efficient*, nor the *final* principle of causation in or to any of these events; though, whatsoever that principle may be in each of these capacities, as the state of the case *is* at present, and always *has been*, its proper effect can be and must be produced *in* time: that time consequently has only an accidental and contingent connection with all such

events, as regards their causation,—*before* they have happened at least*.

It is very necessary however, in all these cases, to draw this distinction of "Before they have happened at least;" for when such events have once happened, the state of the case

* It appears to us just as reasonable to maintain that time is the cause of events which happen in time, merely because they *do* happen in time, as that the earth is the cause of the actions which are done on the earth, because they are done *on* the earth—though if they are the doing of men, they must be done on the earth; or that the air and the atmosphere are the cause of the actions which are done in the air and the atmosphere by creatures which breathe in the air and move about in the atmosphere which surrounds the earth; or that the sun and the day-light are the cause of the actions which are done in the day and by the light of day, and cannot be done in any other way. It seems to be just as true to affirm that time, and not the seed and the ground, is the cause of the plant which springs up from the seed committed to the ground, or of the fruit as matured from the plant after it has sprung up; because both the plant springs up from the seed, and the fruit is matured from the plant, in time. There is something in all these cases, which is the proper cause of the resulting effect; but it is not time: and it appears to be time only because it produces its effect in time, and not at once.

The opinions indeed and statements, which are often put forth concerning time, would lead us to suppose that most people mix up time with their own consciousness, and can scarce form an idea of its existence, apart from themselves. They have great difficulty to persuade themselves, that there can be such a thing as time of which they have no perception. In the estimation of such thinkers, time must stop as often as they go to bed and fall asleep; and must begin again and go on as usual, only when they too awake again. On this principle the sun, and the moon, and the stars, all stood still during the long nap of Epimenides, and the still longer one of the Seven Sleepers of whom Ecclesiastical tradition makes mention. On this principle time must move faster or slower, as a man's attention is more or less alive to its actual course and progress. On this principle the common sense of mankind and common judgment of mankind must have been much mistaken every where, in supposing time to go on by night as well as by day, and when half the world is buried in sleep and unconsciousness, as well as when it is awake and stirring, and aware of what is passing.

These absurdities are all the necessary consequence of mixing up the essence of time with our own sensations, our own perceptions, our own consciousness; and of allowing it no existence beyond and beside ourselves: that is, of regarding it entirely in a subjective, instead of an objective point of view. To deny time an objective existence, in and of itself, abstracted from and independent of all particular relation to other things,

is altered: the relation between time and the events which *do* come to pass, or *may* come to pass, in time assumes a different character. Every one must be aware that a relation, which was contingent and merely possible under some circumstances, may become necessary and no longer contingent under others. And this is the case with the relation of time even to the same event, *before* it has happened and *after* it has happened respectively. An event, which might belong to the category of contingent, and of possible either way, before it *has* happened, ceases to belong to that class, and becomes restricted to the class of necessary, and of possible only in one way, after it *has* happened, and by virtue of the fact of its having happened itself. At least, whether it is conceivable that things, which were contingent *before* they happened, may continue contingent still in any sense *after* they have happened; in other words, whether it is possible for that, which *has* happened, *now* that it *has* happened to be considered still capable of not having happened, as it might have been of not happening *before* it happened; is a question on which we need not enter. Upon this question, the judgment of unassisted human reason may be said to have been pronounced in the well known lines of Agatho[x]—

> Μόνου γὰρ αὐτοῦ καὶ θεὸς στερίσκεται
> ἀγένητα ποιεῖν ἅσσ' ἂν ᾖ πεπραγμένα.

And yet this is more than unassisted human reason ought to take upon itself to predicate of the power of God, on no other grounds than these at least; viz. that to unassisted human apprehension the contrary supposition appears to involve an impossibility and a contradiction in terms. It is sufficient however that the matter of fact holds good as we are contending it does: that whether such a thing as the undoing of the past in the moral world, like the reduction of

is to deny such an existence to any thing in nature beyond ourselves and our own consciousness; for the same kind of reasoning, which would lead a man to conclude that time has no objective existence distinct from his own apprehensions of it, would or ought to lead him to conclude that nothing in nature has an objective, a real, and an independent existence, except himself.

[x] Ethica Nicomachea of Aristotle, lib. vi. cap. 2. p. 1139. l. 14.

matter again to nothing in the physical, be conceivable in the abstract as possible to omnipotence, or not, still there is no instance of it to be met with in the history of Providence, and of its dealings with man. The connection of time with events of every kind, which before such events happened was by no means necessarily to be assumed, when they have happened, becomes *ipso facto* indissoluble; and it is scarcely possible ever after, even in imagination, to consider it otherwise. Every *past* event appears to be determined both to its own time of happening and to its own mode of happening by the fact of its happening itself.

Secondly, with regard to the other comprehensive class of events, the physical, as contradistinguishable to the moral; it must be just as evident, in reference to these also, that time is no more necessarily connected with physical events before they happen, than with moral; one description of physical events only being excepted, viz. those which constitute time itself.

For, as we have already shewn, time itself, in each of its distinctions, is the effect of a natural motion; the motion of the earth about its own axis, or the motion of the moon about the earth, or the motion of the earth about the sun. And these motions are all physical causes of a certain kind; and the effect of these physical causes is that particular reality or form of being, which we call time. It is impossible therefore that time should not have a necessary connection with such physical causes and physical events as these, on which its own essence and its own existence depend; and as much before they happen as after they have happened. Take away these events, and you annihilate the being of time. Suspend these events, and you stop the continuance of time. Alter or modify these particular events, in any way and in any degree, and you alter and modify, in the same manner and in the same proportion, the identity of time with itself before and after.

And if there are any other physical events, which also are necessarily connected with these, for the same reason time must be connected with this class of physical occurrences too, though in a secondary, and not in a primary sense; and before they happen, as well as after they have happened.

We may satisfy ourselves too, on reflection, that some such physical consequents there are, in connection both with the natural motion which causes the first and simplest of the divisions of time, the day and the night, and also with that which produces the next and more complex one of months; and still more with that which gives occasion to the third, and the most comprehensive of all, that of the year.

There are direct physical consequences both of the natural motion of the earth about itself and of that of the moon about the earth, obvious to sense and experience; viz. in the affections of the elements, more especially those of air and water, which accompany those motions and shew that these elements sympathise with them; in the changes of the weather; in the tides of the sea and the air; in the external appearance of the sun and of the moon; and in the sensible distinctions of dark and light. And there are still more direct and palpable physical consequences of the natural motion of the earth about the sun, not only in the different proportions of the length of night and day one to the other, and in the different degrees of heat and cold, at different seasons of the year, or in the visible changes in the place and appearance of the sun, or in the different aspects of the heavens, at different periods of the annual revolution; (all which are directly dependent on this motion;) but also, and still more so, in the varying phenomena of the vegetable and of the animal world; in natural vegetable and animal production, maturity, and decay; in other words, in the cycle or round of the seasons, and of every thing connected with it, which can be referred to no cause *ab extra* but this motion.

With such physical events then, as the effects or consequents of such physical causes or antecedents as these, time must have a connection before they happen, as well as after they have happened; because it has a necessary connection with their causes or antecedents themselves. But with any other description of physical events time has no more necessary connection before they happen, than with any kind of moral; and just the same necessary or non-necessary connection after they have happened as with moral: without prejudice, notwithstanding, to the fact which still

holds good, that all physical events or physical effects, as well as all moral, must be produced and come to pass in time.

SECTION XIII.—*The connection of time with events of all kinds positive, or by appointment.*

If these conclusions however are true, it follows that the connection existing *de facto* between time and events of every kind, when traced up to its origin, must be pronounced to be *positive.* For first : Time has no necessary connection with any description of moral events whatsoever, until they happen ; nor any, except to a limited extent, with physical events, before they happen. If then a connection between time and events of all kinds exists *de facto,* and always has done; it must have been positive in its origin, and so far accidental.

Again : Time has no necessary connection even with this limited class of physical events, before they happen, except as with the natural consequences of certain motions, and of the laws which regulate those motions; both of them prior to and distinct from such effects or consequences. Now no motion could originate itself: no motion could prescribe its own law : no law could either make or enforce itself. Therefore in this case too, the connection of time with events, through such a principle of causation as this, must be positive. And as to its connection even with the motions which are prior to and distinct from such events; whatsoever originated those motions originated time the effect of such motions: and whatsoever else that might be, it could not be the motion itself; the primary impulse of origination at least must have been from without. In no point of view then can time be regarded as self-originated or as self-existent. In no point of view therefore can it be contemplated as determining its own relations to other things distinct from itself. If then it actually exists, and has an actual connection with other things; that must be by appointment.

Now all this is cleared up and explained by Revelation : but by that alone. We learn from Holy Writ that the world is not eternal : that mankind is not eternal : that

time is not eternal: that each and all of these things has had a beginning, yet not simultaneously, but after a certain order: that time was first created (so to say) before any thing else, connected with the present system of things at least: that the measures of time had all been brought into being, had all been fixed and defined, and were all in actual operation, before mankind in particular had any existence: so that, in fact, whatsoever has happened, since the creation downwards, either in the physical or in the moral world, as matter of course has happened *in* time. Nor ought any one to doubt that as this entire constitution and order of things is what it is by the will and appointment of its proper Author and Creator himself; the final end of the appointment must have been accordingly; viz. that every thing might come to pass exactly as it has done, *in time*.

Nor would it be difficult perhaps to discover good and sufficient reasons even for a positive appointment of this kind, were any reasons necessary to account for a matter of fact, which would be just the same whether it could be accounted for or not; or were it becoming in men to speculate concerning the motives of the Divine proceedings; or to propose their own conjectures in explanation of the acts of Providence. Or else, supposing this whole system of things which both Revelation and our own reason concur to convince us can never have existed from all eternity—(must have had a beginning at least)—destined also, from the first, some time or other to come to an end; (and this truth too is as clearly revealed in Scripture as the other;) then even to our own apprehension of what was most becoming, and most to be expected *a priori*, a finite system, and a finite measure of the duration of that system, would appear to be reciprocally adapted one to the other. This system might be one in itself, and in its totality from first to last, and one and entire in the contemplation of its author and contriver from beginning to end; yet if from the necessity of the case it could not be simultaneous, nor co-existent in all its parts; if it must be successively developed, and gradually brought to its completion; especially if it was always intended for the trial and probation of such a being as man, (whose term or period of connection even with his

own system and his own place in that system is necessarily limited to his *day*); with reason might finite measures of duration be contrived and adjusted beforehand to serve the necessities of such a system and of such a scheme as this; that so all might proceed alike, and all might be gradually developed, matured, and completed alike; and all might be bounded and circumscribed, all be defined and measured, by a gradually developed and successively perfected mode of duration also.

In a word, as place is necessary to determine the relations of finite beings to space, so is time, to define their relations to duration. Omnipresence is independent of place; self-existence of time. All distinctions of the former kind are absorbed and lost in the immensity of the Divine Essence; and all of the latter in the eternity of the Divine Existence. But creatures of time and sense, like mankind, must have their *where* and their *when*: their local habitation, to know their connection with space, and their determinate period of being to understand their relation to duration.

SECTION XIV.—*Of Chronology. And first, of pure Chronology.*

The preliminary inquiries into the nature, the causes, and the distinctions of time, which we have found it necessary to institute, having thus been concluded; we may return to the point from which we set out: and that was the subject of Chronology, and the connection of Chronology with time.

It was premised on that occasion that the subject-matter of chronology was time: and it now appears that time, in the most general acceptation of the term, is the natural effect of a natural motion, and of the natural law of that motion—of three kinds, each of which is instrumental to the production of a proper effect of this sort, which we call time. Chronology therefore, if considered as conversant with time in this general sense, must be supposed to be conversant with it in its *first* principles; in its most abstract and general relations; in its highest and simplest and purest form: for which reason, to chronology also, as thus conversant with time, we may give the name of pure and unmixed; the name of *chronology* which has to do with the measures

of time only in their most abstract and general, their simplest and purest form.

It must be evident too that, as supposed to be restricted to a subject-matter like this, chronology must be capable of an high degree of certainty and precision; or rather of the highest degree of certainty, and of the utmost amount of precision. For there is nothing more fixed and invariable than natural causes and their proper effects; or than natural motions and laws of motion: and time itself, abstracted from all other relations, and in its simplest and purest state of existence, is nothing more or less than one of these; the stated and regular natural effect of a stated and regular natural cause. The motions of each kind, which are the instrumental causes of time, are known: the laws of those motions, which are the formal causes of the effect in each instance, are known also: the effect of both, which is time in one or other of its three measures, must consequently be known too, or at least must be capable of being known: and having been once ascertained, it may be relied upon as invariable; as much so at least as the causes by which it is produced. For as long as these may be expected to continue the same, and to operate as they have always done; so long must the same effect from those causes, and the same result from this operation, continue to be reckoned upon also.

The only question, in a case like this, which could give occasion to doubt or discussion, would be that of the absolute primary commencement even of these natural motions; or of the absolute first operation of those motions and laws of motion which determine and constitute time itself. Not whether there is and must be such an absolute primary beginning of time or not; (for enough has been said, we trust, to satisfy the reader that *some* such there must have been;) but simply *when* and *where* it is to be found? And on this point there might be uncertainty beforehand, more or less difficult to be removed. But supposing this question to have been settled, and this *primum mobile* of time to have been discovered; then with respect to the progress or decursus of time itself, as setting out from that primary epoch at first subject to certain motions and

certain laws, and as continued, propagated, perpetuated, by constant iteration and constant succession, in a manner consistent all along with the mode of its origination, and identical with itself ever after : there could be or there ought to be no doubt. Nature itself, and the regularity of the laws and operations of nature, would be our voucher for thus much at least.

SECTION XV.—*Secondly, of mixed Chronology.*

But though the natural measures of time are necessarily prior to all others of the same kind, and are ultimately also the standards of reference for all others of the same kind; still it cannot be denied that these natural measures have never served as the actual measures any where. The artificial day has been every where substituted for the natural day; the artificial month for the natural month; and the artificial year for the natural year: all which artificial distinctions in the measures of time, and artificial substitutes for natural prototypes in the shape of such distinctions, may be or rather must be comprehended under the name of *civil,* in opposition to *natural.*

It is true, these artificial and civil distinctions in theory do not profess to differ from the natural, but rather to be, if possible, antitypes or counterparts of them, and therefore, theoretically, commensurable to them. They profess at least to be founded on the natural; and if they allow of any actual difference between themselves and the natural, they profess to do so on the principle of the adaptation of mean or standing motions and measures of motion to motions and measures of inequality; and on that of relations of excess, in comparison of the standards of nature, purposely admitted and allowed of in their civil substitutes at one time, in order to compensate for relations of defect, purposely admitted at another; and so to rectify one by means of the other perpetually. In point of fact however, there is always more of distinction between these artificial measures and those of nature for which they are substituted, than could uniformly be allowed even on this principle. Nor is it possible by any art or contrivance to prevent this; nor by any system of compensation

so to redress and rectify this discrepancy, that the artificial substitute, in a case of this kind, shall always, or even at stated times, be the actual equivalent of that for which it is substituted, and neither more nor less than what the truth requires perpetually.

These various civil distinctions, in opposition to natural, may all be comprehended under one head, and summed up in one idea, and expressed by one denomination; that of the *calendar*. The definition of the calendar is "The continuous reckoning of time, in all and singular its measures, the diurnal, the menstrual, and the annual, at once, according to an artificial and positive rule of some kind or other:" for all these distinctions in the reckoning of time, both days, and months, and years, enter alike into the constitution and details of the calendar; but days, and months, and years, which are every where artificial or civil, in opposition to natural, and are every where regulated by a rule, which is not indeed every where the same, but is every where, and under all circumstances, an arbitrary, conventional, or positive one of some kind or other, in contradistinction to a natural one.

As then there is one form of time, which is pure and abstract, and independent of every particular relation in which time and its measures are capable of standing to other things besides themselves; (especially of any relation to man, and to the purposes of social or of domestic existence;) so there is another, which having been directly associated with certain particular relations, and especially having been found in connection with mankind and with human society, from the first, may therefore be very properly called *mixed* or *concrete*, in opposition to the former which is *pure* and *abstract*. And as there is one branch of chronology, which, as having to do with the former and the former alone, was to be designated *pure* and *abstract* too; so will there be another, which as having to do with the latter will deserve, on that account, to be called *mixed* or *concrete* also.

The subject-matter of the former are the measures of time in their natural distinctions and in their natural relations only; that of the latter are these same measures in their artificial distinctions and in their positive relations; in one

word, the calendar, and whatsoever there is to distinguish the calendar-measures of time from those of nature. The former, in the order of time, is prior to the latter; because its proper subject-matter is so, in comparison of that of the latter. The former is capable of being reduced to much greater certainty than the latter; because the former has to do only with the constitutions of nature, the latter, over and above these, is concerned also with the appointments and ordinances of men. The natural distinctions of time are few and simple; the artificial are many and complex. The former are uniform and constant; the latter are variable even from the necessity of the case, if they are to be capable of representing the former at all—to say nothing of any liability to vary, beyond and beside the necessity of the case, from every cause which is capable of affecting the constitution, or of influencing the administration, of the calendar —not only the involuntary ignorance and mistakes, but the wanton and random innovations, the follies and caprices, of men themselves.

The natural measures of time too have had only one *primum mobile*, one point of departure, or epoch; which never has been, nor could be, nor is even at present, any thing different from what it was at first. The civil calendar also might have had only one epoch and point of departure at first; (though that is a matter of fact, which we should not be justified in assuming without sufficient proof of its truth;) but whatsoever it might have had at first, it would still be notorious and incontrovertible that, since the beginning of human society, it has had almost an infinite number of epochs and points of departure; a different one almost in every age, and in every country, and among every nation on the face of the earth.

And on this account, more particularly, *mixed* chronology, being properly conversant with so complicated a subject-matter as this of the actual differences of the actual measures of time one compared with another, and of all in comparison of those of nature, in all countries, and at all periods of human existence; is necessarily exposed to much more uncertainty than *pure*, which has to do only with the natural distinctions and reckoning of time. The preliminary busi-

ness here is only to ascertain *first* the general causes of those distinctions, the motions on which they depend, and the laws by which these motions are regulated; and in the discharge of this first part of its task chronology has the assistance of astronomy, to which such investigations belong even more properly than to itself. *Secondly* to fix and determine the common epoch or point of departure, from which all must have set out at once, if all came into being together. And here too chronology has not only the help of astronomy, but the guidance and direction of revelation, in the shape of Holy Writ; which is the highest and most authentic form of historical testimony, from a quarter which could not be mistaken and cannot mislead. Mixed chronology would still have its share of this difficulty to contend with, had it only to do with the primitive calendar; and with that too as supposed to have had no other origin at first than that of the natural measures of time themselves, nor ever to have deviated afterwards from this archetypal standard of truth further than the necessity of the case itself might require. But over and above this it has and it must have a great deal more of difficulty to contend with, peculiar to itself; arising from not merely the possibility, but the fact, of the substitution of new types of the standard of nature, instead of the first and original one; from the various relations of these new ones compared with those of the old; from the necessity of finding out and fixing the historical epoch of the substitution in each of these instances, and of tracing and following out the subsequent history of such variations; of investigating in short and ascertaining the whole cycle of changes, transitions, and modifications, in passing from one state to another successively, through which the original type of nature itself may have had to run.

Every one must perceive what perplexities and embarrassments were likely to beset every step in such inquiries as these; (perplexities and embarrassments, which, at first sight, might be pronounced insuperable;) and what a tangled and complicated web the perpetual history of calendars must thus present to the chronologer to be unravelled. Otherwise, supposing the settlement of all the necessary preliminary points to have been effected; even mixed chronology is susceptible

of a degree of certainty, inferior only to that of pure and simple. For if the historical epoch of a particular calendar has once been determined; if its composition and structure have been discovered; if its laws have been defined, and its management and administration have been ascertained; then such a calendar, while it continues in use without change, must be as absolute and invariable a measure of time, within such limits as are prescribed by its own nature and constitution, as the measures of nature themselves.

SECTION XVI.—*Thirdly, of historical Chronology.*

The third and last division of chronology is the historical: and this differs from both the preceding in having to do with the measures of time not in themselves, nor independently of any of their possible relations to other things, but always, and exclusively, in connection with the events which happen in time. It is the business of history to relate every thing which has happened both in the moral and in the physical world; the most important at least, and the most remarkable, of the events of either kind: though were such a thing possible as a strictly universal history, it would take account and it would give an account of every thing which has happened, and every where, both in the moral and in the physical world alike.

And amidst the endless variety of such events, which from the nature of the case would come within the scope of an universal record like that, as *one* means of distinguishing one from another, and of referring each to its proper order in the general succession, history would make use of chronology; and as another and not less necessary, in order to affix and appropriate in particular instances the distinctions of place, it would make use of geography. For time and place, taken together perpetually and applied for such a purpose in conjunction, are competent to distinguish between all events; even those which are most like one another, and most liable to be confounded together. But if every event is to be assigned to its own order of time, and to its own situation in space, without confusion and without disturbance perpetually, history must be in perfect possession both of the science of time and of the science of place;

and of all the possible or actual modes of the one, and of all the possible or actual distinctions of the other: and this science of place it must learn from geography, and that science of time it must learn from chronology.

The connection of history with chronology in fact is necessary. For it has been shewn that though the connection of time itself with events, before they happen, is accidental, contingent, and indifferent; yet after they have happened, it is so no longer: and as history itself is connected solely with the past, chronology subservient to history is connected solely with the past too: but its connection with the past in this case is indissoluble. History has no concern with the future at all; nor properly speaking even with the present. Chronology may have to do with the present; but with the future it has no more to do than history, except hypothetically; i. e. on the supposition that the course of the future, with respect to time, will be altogether similar to that of the present and of the past.

It is evident too that history is concerned with time, and with the measures of time, through the medium not of *pure* chronology but of *mixed;* that what it must and it does require to make use of every where, even for its own ends and purposes, is the civil calendar; and that it will and it must be more or less adequately supplied with one of its most important and most indispensable instruments, in proportion as the science of mixed chronology is more or less complete. History has to do, or may have to do, with all parts of the world which are capable of becoming the scene of moral or of physical events, sufficiently important to attract its notice; and with all points of time at which they may happen; and with all distinctions and denominations of the agents or the subjects, among whom they may happen. And forasmuch as all countries and ages and nations have had and still have their proper civil distinctions in the reckoning of time; history ought, if possible, to be put in possession of all: and whithersoever it directs its researches, thither it ought to be able to carry along with them also the proper measure and proper reckoning of civil or calendar time.

It is manifest too that even with the help of chronology to assist and to direct it, yet from the complex and multifarious

nature of its proper subject-matter, and from the special disabilities under which it must always be liable to labour in particular instances; history must still be exposed to great difficulties in the discovery of the truth, and to great uncertainty in the circumstantial account of events as they have occurred and in the order of their occurrence: yet still not so much so, as if it were destitute of all light and information *ab extra;* and even the less so in proportion as the two auxiliary sciences, on which it depends for this illumination and direction, chronology and geography, are themselves more perfect and complete. So that, as Scaliger justly observed, if geography is one of the eyes of history, chronology is the other: and it is difficult to say which of the two is the more necessary to it.

In a word; if historical chronology is a more precarious and uncertain thing than mixed, and mixed than pure, yet all three are necessary to the sum and effect of chronology in general; we must look for the proper evidence of the joint cooperation of all the three, and for the united effect of them all, in the perfected work of history on the one hand, and in that of astronomy on the other: the former of which has to do with the greatest and most important of moral events, the latter with the grandest, the noblest, and the most sublime of physical. It must be certain at least, that if chronology is to be regarded as subservient to the use and benefit of history more particularly, the natural course of things, in order to realize this use and benefit to the utmost possible extent, must be to begin with pure chronology, to pass from that to mixed, and to end at last with historical. Any order of proceeding different from that must be an ὕστερον πρότερον; of which it would be easy to foresee that it must either fail of its effect altogether, or attain to it very imperfectly.

And yet the course which has generally been adopted hitherto is notoriously the reverse of this; viz. to begin with historical chronology, that is, with the application of chronology to history, at once; as if the principles of pure chronology themselves required no preliminary consideration; or as if those of mixed chronology in particular, (the science of calendars at least,) were already so thoroughly explored, so accurately defined, and so well understood, that they could

be susceptible of no further improvement, and no addition to the stock of such knowledge already accumulated was either wanted or capable of being made: though it was always an undeniable fact, and it is so still, that greater obscurity, greater confusion and perplexity, and (if we shall not give offence by the use of such an expression) even greater ignorance never existed, nor at this moment still exists, on any subject to which the attention of learned men has been so long directed, than on this of the calendars of antiquity.

It is not therefore surprising that historical chronology, (i. e. history as making use of chronology,) never yet having been adequately furnished for its peculiar office and employment before it set about its performance, has never yet been able to accomplish as much as it was bound to do; or as much as it expected to do; or even as much as it professed to have done, in its proper department itself. The utmost degree of uncertainty still prevails on many important and even fundamental questions, which ought long since to have been settled for ever. Chronologers continue to build as if no foundation had yet been laid; and one system is reared up after another, each on the ruins of the preceding one: yet those who have been most successful in undermining and demolishing the structures of their predecessors, when it comes to their own turn to construct a similar building out of the same materials, are not found to lay a safer or surer foundation, nor to put their materials together more skilfully or more securely, than their predecessors had done before them.

And what is the reason of all this? or why should chronology in particular, like Penelope, be constantly employed in weaving and unweaving the same web? or to what is the blame to be ascribed, that so much has been attempted, and so little accomplished, in this one department of learning, ever since the revival of letters? Not to the want of ability on the part of the labourers or architects, nor to the default of pains and industry; but, if the truth must be spoken, to the perverseness of the methods of proceeding hitherto employed; to the viciousness of first principles; to the radical defectiveness of all such systems: and in particular to the fatal mistake, into which all have fallen, of beginning their

work where they ought to have made an end of it; i. e. of taking that first in the order of their inquiries, which nature and the reason of things intended to be, and the matter of fact had made, the last.

The foundations of historical chronology are laid in mixed, and those of mixed in pure; and the principles of pure are laid in the appointments and constitutions of nature. In no other order then should we attempt to proceed, but in that which is thus defined. Let the principles of pure chronology be first clearly ascertained and laid down: and the limits will then be known which nature itself has prescribed to the possible modes and varieties of human or civil time. Let these principles and these conclusions be applied in the next place to mixed chronology; that is, to the modifications and changes which even the constitutions of nature have every where experienced at the hands of man: and unlimitable as these might appear to be *a priori*, it will be found *de facto* that they have had their limits; and that, whether it has been from accident or from necessity or from the control and direction of a superintending Providence, civil or calendar time has nowhere, nor in any age, differed from natural except in accidents and circumstantials. When all this has been done, then let historical chronology take up and continue the process; i. e. let history, aided and abetted by an enlightened and well-informed chronology, set about its proper task: and it will be found, in repeated instances, that its work has been more than half completed even before it has yet been begun.

DISSERTATION II.

Elements of pure Chronology.

CHAPTER I.

On the Cycle of Day and Night, and on the measure thereof recognised in the Fasti Catholici.

SECTION I.—*On the Diurnal Rotation.*

THE movement of circumrotation, by virtue of which the earth is constantly revolving about its own centre of gravity, is called by astronomers the Diurnal Rotation. It is agreed that this movement is uniform; that it goes on at the same rate perpetually. No observation, either in ancient or in modern times, has been able to detect any variation in this one of the operations of nature. Anomalies may be discovered in other natural motions; even in those which are directly concerned in the production of time: but no fluctuation nor irregularity has yet been perceived in the diurnal rotation. Astronomers, it is true, have been made aware of this fact from observation or experience; for neither the fact itself of the diurnal rotation, nor the law of the rotation, could be concluded *a priori* from theory only. But knowledge which is grounded on experience, (constant and uninterrupted experience,) especially of such things as the acts and processes of nature, rests on the surest basis.

A given point on the surface of the terrestrial globe, or a given series of such points, all comprehended in the circumference of the same great circle passing through the poles of the earth, such as astronomers or geographers mean by a terrestrial meridian, being referred to a given point in the heavens, such as the locus of one of the fixed stars; and this meridian and this star being supposed to be in conjunction, (that is, in the plane of the same circle produced,) at a given time of a given day, (for instance, the time of noon,) shewn

by a duly regulated clock or timepiece: it is observed, as an invariable phenomenon, that they remain in this state of conjunction scarcely for a moment; the one passes away from the other under the eye of the spectator. But it is also observable that after a certain interval, (that is, when the hour index of the timepiece has described an entire circle of the dial plate,) the same star and the same meridian are again in conjunction; are similarly situated, relatively to each other, at the same time the next day as the day before.

It follows that meanwhile either the star must have made an entire revolution of the heavens above the earth; or the earth an entire revolution about its own axis under the star. Astronomers have long been agreed that the true explanation of the phenomenon is this latter; that the meridian has been again brought to the star, and not the star to the meridian; and therefore by the motion of the earth about its own axis, while the star stood still, and not by that of the star about the earth, while the earth was stationary.

The actual revolution of the earth however about its own axis, in one direction, necessarily producing an apparent revolution of the heavens in the opposite direction; we are made indirectly cognizant of the former by sensible perception of the latter: and the phenomena of the diurnal revolution of the heavens are not only so many sensible indications of a latent and insensible physical fact, the diurnal rotation of the earth, but so many criteria of the law also by which the diurnal rotation itself is regulated. These phenomena are constant and uniform. They are exhibited by all parts of the heavens alike. They are common to all the stars. In short, under the same circumstances of their observation, no difference is discoverable in them; from which astronomers infer that the diurnal rotation affects all the stars in the same way; and therefore must be one and the same thing in itself, operating in a similar manner, and according to the same law, perpetually. These things may be taken for granted in a chronological work, because they may be found stated and proved in every astronomical one; and whatsoever astronomy has established chronology is at liberty to assume. For the same reason, (that is, because astronomers also employ the same language,) we may be allowed to speak of the

noctidiurnal revolution of the stars or of the sun; though there is no actual motion of that kind but the diurnal rotation of the earth: and of the annual motion of the sun; though the earth only, and not the sun, really moves in the ecliptic.

It would be more to our proper purpose at present to observe that, if there be such a thing as a primary or elementary principle of time, and that principle is the first of the natural measures above enumerated; it is with reason that, according to the fiat and appointment of the Creator, this first and simplest of the measures of time has been found attached from the first to the most fixed and invariable, as well as the simplest, of the three natural motions which are the natural causes of time in general. The question therefore which we have to consider is not, whether this one particular cause of that particular effect, which we call time, is stated and regular in its operation; but what is the effect itself? in other words, assuming that the law of the diurnal rotation is constant, and that the mode of its operation is invariable, what *we* have to determine is, what makes or defines one such revolution? where it begins, and where it ends? and what is the absolute interval between any two of these revolutions perpetually?

SECTION II.—*On the measure of the diurnal rotation, as independent of the cycle of Light and Dark: that is, by the mean sidereal day.*

The time which is observed to elapse between the departure of a given star from a given meridian, and its return to it again, or (as astronomers commonly speak of it) between any two consecutive transits or passages of the same star over the same meridian, is called the sidereal day; and wheresoever such passages are regularly noticed, (that is, in all observatories,) and are similarly reckoned either in mean sidereal or in mean solar time perpetually, the absolute interval between any two in sequence is seen to be the same. Therefore one measure of the diurnal rotation must be the sidereal day: for, after what has been premised, it cannot be doubted that the interval between any two consecutive returns of the same star to the same meridian is the length

of time taken up by one entire and complete revolution of the earth about its own axis. It cannot be doubted that, if one of these revolutions is supposed to have begun precisely at the moment when a given star was *on* a given meridian, *that* must be over, and another must be beginning again, exactly at the moment when the same star is next on the same meridian again.

Accordingly, it is agreed among astronomers, that the most accurate measure of the length of the sidereal day, which can be determined, is also the most exact measure of the diurnal rotation; though, even in this case, it is very necessary the reader should keep it in mind that, however exactly the sidereal day may measure the diurnal rotation, it does not constitute it. Nor does this rotation depend on the stars, but on causes which must have begun to produce their effect at first without any reference to the stars, and would continue to do so still though there were no stars to which to refer it; such as the original impulse of circumrotation, the amount of the force impressed, the law of the revolution prescribed and the uniformity of its operation, the free motion of the earth itself in space, the magnitude of its circumference, and the proportions of the circles described by every part of its surface, among themselves, perpetually; and the like.

Why then is not the sidereal day to be at once assumed as the standard of the first and simplest, and withal the most invariable, of the measures of time? that which is the constant and regular effect of this constant and regular cause, the revolution of the earth about its own axis? The sidereal day is indeed such a standard: and did the first and simplest of the distinctions and measures of time imply no more than a constant reference to the fact of the diurnal rotation, no other standard of this measure could be adopted; because none else could be found *in rerum natura* but the sidereal day. But the idea of this distinction includes more than the simple idea of the diurnal rotation. It comprehends also that of the succession and alternation of day and night. This first and simplest of the measures of time is synonymous with the noctidiurnal cycle: and as the mean sidereal day *de facto* is less than the mean solar day, it would soon be found from experience, that to measure the noctidiurnal

cycle by the stars perpetually would be to turn night into day and day into night perpetually too.

SECTION III.—*On the measure of the diurnal rotation, as including the cycle of Light and Dark: that is, by the mean solar day.*

The truth is that, though the alternate succession of night and day is not the same thing as the diurnal rotation, and though the hypothesis is conceivable of a constant revolution of the earth about its own axis, and of no such sensible phenomenon as the alternation of light and dark to accompany it; yet, as these things actually are connected, and (within the limits of human experience) always have been so, the succession of day and night is an inseparable accident of the diurnal rotation. But the true ultimate cause of this connection is another fact; viz. that from the place of the earth in its own system, and from its proper relation to the different parts of that system, it is inseparably connected with the sun. It revolves round itself: but it revolves also round the sun. The diurnal rotation is the succession of day and night, because it is the alternation of light and dark; but this alternation of light and dark, involved in the diurnal rotation, is the necessary consequence of the union of two motions, the diurnal rotation and the revolution of the earth about the sun.

The sun is the centre of light and heat to the earth, and to the rest of its proper system: the sun too, even as the dispenser of light and heat to all parts of the system dependent upon it, is still only a star; differing in appearance from the rest of the stars solely in consequence of its being so much nearer to the earth than they are. The sun too is stationary in space, as much as the rest of the stars[a]: only that its proper *locus* in space is one of the *foci* of the various ellipses which both the earth and the rest of the planets are constantly describing about it. A given meridian on the earth then by being referred to the sun does not cease to be referred to the stars; and successive returns of the sun to this meridian, or of this meridian to the sun, may be considered a measure of the diurnal rotation even in terms of the side-

[a] See however supra, note, page 17.

real day, and yet successive returns of light and dark too, cycles of day and night as well as of the diurnal rotation; and cycles of the former kind more or less commensurate with cycles of the latter kind perpetually. For no one requires to be told that the periodic returns of the same meridian to the sun for that particular meridian are the cycle of its proper day and proper night; and that between one such return and another all the vicissitudes of light and dark, and all the proportions of one to the other, to which it is liable, must be comprehended perpetually.

There is then a secondary form of the measure of the diurnal rotation, derivable from the stars; viz. by regarding the sun as a star, and by referring the diurnal rotation perpetually to the sun: a form too which nature has designated as the primary element of time for human purposes, by making it the proper standard of the cycle of day and night, as well as of the diurnal rotation. As to the comparison of these two forms one with the other; the sun and a star being both assumed to be on the same terrestrial meridian at a given time on one day, it is found by experience that they will not be both on the same meridian again at the same time the next day; but that the star will return to it *before* the sun, and the sun *after* the star. This phenomenon is explained by the fact that the star has no motion of its own, to interfere with its return to the meridian; but the sun has a motion, which is always carrying it forwards in the heavens in the opposite direction to the apparent motion of the stars. In the interval therefore between one passage over the same meridian and the next, the sun has moved away from the star, but the star has stood still where it was. The star therefore must come again to the meridian, by a certain interval of time, earlier than the sun; and the sun, by the same interval, later than the star.

But even this is not all. The motion of the sun itself in the ecliptic is not uniform; but sometimes faster and sometimes slower. It will sometimes therefore have moved a greater distance from the star in the interval between two passages, and sometimes a less; and consequently it will not always return to the meridian again at the same distance of time after the star, but sometimes sooner, sometimes later.

All these variations in the circumstances of the same phenomenon are matter of daily observation. They prove however that while the returns of the sun to a given meridian do constitute an actual measure of the diurnal rotation, as well as those of the stars, and what is more do constitute also the proper measure of the actual cycle of day and night; yet they are not an uniform measure of either: that both the diurnal rotation and the noctidiurnal cycle so measured perpetually would be more or less variable quantities. But what we are in search of, as the measure of time in its first its simplest and most elementary form, is an invariable measure of both at once.

To find this invariable measure both of the diurnal rotation and of the noctidiurnal cycle, astronomers have recourse to the hypothesis of two suns, besides the real or actual sun; one of which is supposed to move in the ecliptic, the other in the equator, but each with the mean motion of the actual sun. And all these, both the real sun and these two imaginary suns, are assumed to have set out together, some time or other, from the same absolute point of space, (the intersection of the ecliptic and of the equator or equinoctial,) called the vernal equinox. It is easy to see, under these circumstances, that while the actual solar day will be described by the first of these suns the mean solar day will be described by that which moves in the equator; and that while the length of the day, described by the actual sun, will vary perpetually within certain limits, that of the day described by this equatorial sun will be invariable: and that while no fixed standard of measure will apply to the former there will be such a standard of the latter; that all the days described in the latter case will be equal, and the length of each of them will be the mean or average length of all the days actually described by the actual sun in the course of the actual solar year. It is easy to comprehend too, with respect to the sun which is supposed to move in the ecliptic, that as its motion is constant and uniform, and equal to that of the sun in the equator, it must be commensurate to that of this in the equator; and the two suns themselves must have the same right ascension, and must come to the meridian together, four times in the year, viz. at the two equinoxes, and

at the two solstices; and that once at the apogee, and once at the perigee, of the actual solar orbit this mean sun in the ecliptic must be found in conjunction with the actual sun, and both must come twice in the year to the meridian together.

The length of the mean solar day, as thus deducible from the average length of all the actual solar days in the course of the actual solar year, is the period of twenty-four hours of mean solar time. Observation cannot detect the returns of the mean sun to the meridian daily: but it can determine those of the actual sun, and with the utmost precision, first in apparent time, and secondly, by applying the equation of time, in mean solar time also. The mean or average interval of each of these returns throughout the year is the period of twenty-four hours of mean solar time; which is therefore the measure of the mean solar day. The diurnal revolution of the earth about its own axis being referred to this mean sun, and to a given star, respectively, it is found to be longer in the former case than in the latter; but by a stated quantity, which makes the difference between the mean solar and the mean sidereal day perpetually: the substraction of which from the mean solar day is found to give the measure of the mean sidereal day; and the addition of which to the mean sidereal day is found to give that of the mean solar day.

These coincidences therefore may be considered an intimation of nature that, according to its own appointment, while the proper, legitimate, and perpetual representative of the first and simplest and most elementary of the measures of time, in the sense of the diurnal rotation, is and must be the mean sidereal day; the proper, legitimate, and perpetual representative of the same first and simplest measure, in the sense of the noctidiurnal cycle as well as of the diurnal rotation, is and must be the mean solar day; the interval which brings back a given meridian to the mean sun; the cycle of 24 hours of mean solar time. If there is a difference between this mean solar day and the actual solar day, it is accidental; and it is greater at one time and less at another, and *vice versa*. It cannot exceed 16 minutes of mean time, and a little more, at the utmost; and there are four times in every year at which it disappears altogether, (or nearly so,)

and when the mean and the actual solar day are both of the same length, and the mean and the actual sun both come to the same meridian at once. Apparent or solar time indeed is constantly reckoned after the one, and mean or clock time according to the other; and though apparent solar time is commonly called *true* solar time, it would be more correct to restrict the name of true solar time to mean solar time; especially as brought down according to an invariable law of succession, and as measured by an invariable standard, from the first. Apparent solar time, which is never the same for two days together, can be true at a given time only in the sense of *de facto* or *actual* time; but mean time, in the sense explained above, and as brought down in one and the same manner from the first, must always be *true* time, must always be time which *has been*, time which *is*, and (while the laws of time continue the same) time which *will be*[b].

SECTION IV.—*Conclusion from the above premises. Sense and meaning of the terms Noctidiurnal Cycle, as used in the Fasti Catholici.*

The result of the preceding reasonings is *this*: That the proper and never-varying standard of the first and simplest of the measures of time is the mean solar day; the mean cycle of night and day, (or the actual cycle, so far as it may be considered at a given time as the same with the mean,) the cycle which is measured or measurable perpetually by the integral period of 24 hours of mean solar time. This is consequently the only standard of that measure which will henceforth be recognised in our Fasti; and this is the meaning which must be attached to the phrase of the cycle of day and night, or of the noctidiurnal cycle, as often as we shall have occasion to use it: the integral period of 24 hours of mean solar time, which measures the length of the mean solar day in general, and in a given instance the interval between two consecutive returns of the mean sun to the

[b] On the subjects considered above, see Ferguson's Astronomy, chap. xiii. § 224 sqq. 1811. edited by Brewster: the Astronomical Tables and Formulæ of the late Francis Baily esq. (privately printed and distributed in 1827.) p. 16, sqq.: Traité Élémentaire d'Astronomie Physique of Mons. Biot, tome iv. p. 524. ch. xiv. § 357, sqq. Paris, 1847: and the Introduction to the Tables of the Fasti Catholici, parts ii. and iii.

same meridian. Not indeed the same integral period of 24 hours of this kind, for that would be contrary to the nature of time, which is to be generated by succession; but a series of such periods, one taking up another perpetually, and (except in the order of succession, and in the place of each in the succession numerically) one the same with another perpetually.

And mean solar time being invariable, and one hour of mean time being necessarily equal to another; the diurnal rotation being invariable also; if one entire revolution of the earth admits of being measured by one such period of 24 hours, any number must do so too: and therefore, if the succession of these revolutions has been going on, in the same way, from the first; if neither the revolution nor the law of the revolution has ever been interrupted or changed; it must be self-evident that there neither can have been, nor ever has been, a single revolution of the earth, which must not have had, and has not had, not only its own proper place in the succession, but its own representative in some period or other of 24 hours. And did we but know the common epoch both of the constant revolution of the earth from the mean sun to the mean sun again, and of this constant cycle of the period of 24 hours which has accompanied it; no one could venture to deny that nothing might more easily or more infallibly be done, than either to determine the absolute sum of cycles of both kinds which could possibly have entered the succession in conjunction from first to last, or, (were it necessary so to do,) to specify the order and place of a particular cycle of either description in the succession itself.

Section V.—*Objections to the above assumptions.*

It may be objected indeed to our assumptions that, in referring the measure of the diurnal rotation or of the noctidiurnal cycle to the mean sun perpetually, we are referring an actual succession of things from the first to something which never had a real existence. But this objection concerns astronomy as much as chronology, if not more so; and since astronomers have never perceived any thing exceptionable in such a supposition, chronology need not scruple to take advantage of it too. The tables of the astronomer are

constructed on the hypothesis of this fictitious sun; and his rules for the reduction of apparent or actual solar time to mean are founded upon it. It is enough that the distinction between mean and invariable, and actual and variable, motions in this case is conceivable; that the mind can represent this mean sun to itself perpetually, though the eye cannot; and that calculation can follow and take account of its movements more readily and more certainly than even of those of the real sun.

It may be objected to us also that, in reducing the measure of the diurnal revolution to the standard of the mean solar day, which is always estimated in terms of the period of 24 hours, we are making a lesser division of time the standard of a greater; and in particular that we are recognising the division of day and night into hours as *natural*, contrary to what we contended for elsewhere[c]; that there was no natural division of time less than that of the day and the night. There is no inconsistency in so doing. Every whole of every kind, as we also observed on the same occasion[c], which is not absolutely an atom and indivisible, must admit of being decompounded, and resolved into smaller parts; and no one will maintain that the cycle of day and night is an integer of such a kind as not to be divisible into smaller parts.

Some division then even of the cycle of day and night must always have been possible, though nature itself might have made none. As to the fact of the division, that must be judged of as other questions of fact are. And as to the modes of the fact, or to the number and kind of such divisions which may have been instituted in particular instances; the distinction of the cycle into 24 equal parts is that which has existed for the longest time, and that which has been most generally found in use; and therefore, whether even this mode of dividing it has been as old as the beginning of human time, or was first made by mankind for themselves, or not, it must be considered that which was most suitable to the wants of society in general, and best adapted to the subject of division itself. Yet some nations have divided the same cycle into eight parts, each of them equal to three of this; and the

[c] P. 23, 24. Diss. i. ch. i. § 9.

Chinese at the present day divide it into 12 parts, each of them equal to two of the other; and even into one hundred parts; each of them $=0^h.24$, or to $14^m.4$ of mean solar time.

It must be evident after all, that to say the cycle of the diurnal revolution is equal to 24 hours of mean solar time, or is made up of 24 hours of mean solar time, is only to say it is equal to itself, or it is made up of itself. It gives us a clearer idea of what we mean by the cycle itself, when it is thus presented to us, broken up into so many constituent parts; each of which can be more distinctly comprehended by itself than all in conjunction. But the cycle is just the same natural unit, the same simple idea in itself, whether so represented or in any other way.

CHAPTER II.

On the measure of time by the month.

SECTION I.—*The measure of time by the month derived from the Moon, not from the Sun.*

THE second of the natural measures of time is the month. The instrumental cause of this measure is the revolution of the moon about the earth: and if that is the original foundation of any such distinction of time as the month, it follows that neither the idea nor the fact of this distinction could have been derived from the sun.

The common conviction of mankind and the *usus loquendi* every where confirm this conclusion; the word *month*, in every language both ancient and modern with which we are acquainted, being either mediately or immediately derived from the name of the moon*. If then both the name of the

* This derivation of the name of the month (that is of the *word* for *month*) is particularly true of the ancient languages of Europe, and of their modern representatives; as we hope to shew more at large, if we ever come to treat of the calendars of the north of Europe in general. Our own word *month* comes from the Anglo-Saxon *monath;* and that from the name of the moon in that language. It is a curious coincidence

month, and the idea implied thereby as that of a measure of time, have been transferred to the subdivisions of the solar

that in the ancient British, as represented by the Welsh or Cambrian, the name of the month was *mis* or *mys;* which every one must allow to be absolutely the same with the Greek μείς. In French the name of the month is still *mois:* and between the old British, the modern Welsh, the ancient Gallic, and the modern dialect of that part of France which is called Bas-Bretagne, Lower Brittany (Armorica), the affinity was and is still very close. As to this term μεὶς in Greek, we apprehend it is probably the oldest form of the word for month in that language: and though grammarians speak of it at present as a dialectical form of μὴν, most characteristic of the Æolic, yet it occurs in Homer and in the fragments of Anacreon, neither of whom was an Æolic Greek; as well as in Hesiod and Pindar, both of them Æolic Greeks.

The Hebrew for month is *Eedass*—as we write and read the term: or *Chodesh,* as it is commonly pronounced and spelt. This word was first applied to the primitive solar month; afterwards to the lunar. It comes from a root denoting *newness,* and consequently *variableness,* or *liability to change:* and why a word carrying with it such an idea as that should be first applied to the primitive solar month, no one, who knows any thing of the true nature and constitution of the primitive civil year, can be at a loss to comprehend; as we hope also to shew more at large hereafter. Such a name, and so founded, however was still more applicable to the lunar month; and therefore it is not surprising that Jesus Siracides should tell us the month in the Hebrew, (that is, his own language,) was called after the name of the moon[d]. But the Hebrew has another name for the month, which must have been its peculiar or proper name in that language from the first; and which too we shall have occasion to explain elsewhere.

The Latin for month, *mensis,* Cicero would derive *a mensis spatiis*[e]: Adhibetur autem ad partus (Diana sc. vel Lucina) quod ii maturescunt aut septem nonnunquam, aut ut plerumque novem, lunæ cursibus: qui quia mensa spatia conficiunt menses nominantur. The Latin mensis however, it is most reasonable to suppose, is ultimately derivable from the Greek μὴν. The e is naturally long in the Latin word; and expressed in Greek characters this would be μηνσις. Mensis nomen est Græcum, says Isidore[f], de lunæ nomine tractum. luna enim μήνη Græco sermone vocatur. Yet mensis is not from μήνη—but as we have observed from μὴν or μείς.

With regard to μὴν or μεὶς, it is difficult to suppose that it must not have been originally the same word. We do not indeed know how μεὶς was inflected; for it occurs only in the nominative case: whether it followed the analogy of other words, ending in εις, as Σιμόεις, πυρόεις, and so increased in εντος, or a rule of its own, increasing in εινος: which to

d Ecclesiasticus xliii. 8.

e De Natura Deorum, ii. 27, 69. cf. Varro, De Lingua Lat. v. p. 54.

f Origines, v. 33. 41. B. (Opera, 1617.)

year; this must have been done, in the first instance, on the principle of analogy.

judge from the actual inflection of μὴν, μηνὸς, is most probable. Before the character η was introduced, the long ε in Greek and the short were both expressed by ε alike. This is the best explanation of the form μὴν, as only an accidental variation of that of μείς. According to Stobæus[g] indeed, Chrysippus, the Stoic philosopher, would have made a real distinction between them; such that μὴν should denote the whole of the lunar month from conjunction to conjunction, μεὶς so much of the whole as that part of it for which it is visible—a part of the lunar synodic period, which is comprehended between the first phasis and the last, and is sometimes called by astronomers the *Illuminative* month. Μῆνα δὲ καλεῖσθαι τὴν τοῦ δρόμου αὐτῆς περίοδον. μεὶς δ' ἐστὶ, φησὶ, τὸ φαινόμενον τῆς σελήνης πρὸς ἡμᾶς. Theophrastus too uses the word μεὶς for the moon three days old[h].

Very fanciful derivations are found on record, both for *luna* in Latin, and for μὴν or μήνη, and for σελήνη, in Greek. Servius derives Luna from *lux aliena* (just as he does bruma, a brevioribus diebus[i]). Unde Luna *lux aliena* dicitur; a sole enim lumen accipit: unde et Græce σελήνη, quod σέλας, id est *lucem*, habeat ἄνω, id est *superne*, hoc est a sole[k].—Μὴν[l] . . . ὡς παρὰ τὸ κέφαλος κεφαλὴν, οὕτω καὶ παρὰ τὸ μεῖος μείην, καὶ κατὰ συγκοπὴν μὴν, ἀφ' οὗ καὶ μήνη, ἡ σελήνη. Plato seems to have set the example of such etymologies among the Greeks; explaining the word σελήνη, as if it was compounded of ἕνη and νέα—the former in the sense of old, the latter in that of new; both entering the word for moon, whether in the form of σελήνη or in that of σεληναία, alike: Νέον δέ που καὶ ἕνον ἀεί ἐστι περὶ τὴν σελήνην τοῦτο τὸ φῶς, εἴπερ ἀληθῆ οἱ Ἀναξαγόρειοι λέγουσι. κύκλῳ γάρ που ἀεὶ αὐτὴν περιιὼν νέον ἀεὶ ἐπιβάλλει, ἕνον δὲ ὑπάρχει τὸ τοῦ προτέρου μηνός. Πάνυγε. Σελαναίαν δέ γε καλοῦσιν αὐτὴν πολλοί. Πάνυγε. ὅτι δὲ σέλας νέον τε καὶ ἕνον ἔχει ἀεὶ, σελα- ενο- νεο- άεια μὲν δικαιότατ' ἂν τῶν ὀνομάτων καλοῖτο, συγκεκροτημένον δὲ σελαναία κέκληται[m].—Σελήνη, παρὰ τὸ σέλας νέον ἔχειν. ἢ παρὰ τὸ σέλας ἀεὶ ἓν (corr. ἕνον or ἕνον καὶ νέον) ἔχειν· ὅθεν καὶ ἕνος ὁ ἐνιαυτὸς, ὁ ἀεὶ νεάζων[n].—Σελήνη, ἐκ τοῦ σέλας αὐτὴν νέον ἔχειν ἀεί[o].—Τὴν δέ γε σελήνην, παρὰ τὸ σέλας ὀνομαζομένην, Ἄρτεμιν ὠνόμασαν, οἷον ἀερότεμιν· ἅτε δὴ διὰ τοῦ ἀέρος ἰοῦσαν, καὶ τοῦτον τέμνουσαν[p].—Ἡ δὲ ἀερώδης (ἡ σελήνη·) διὸ Ἄρτεμις πρὸς τινῶν εἴρηται, ἀεροτόμος τις οὖσα[q].—Μῆνες προσαγορεύονται ἀπὸ τῆς μήνης, τουτέστι τῆς σελήνης, σελήνη δὲ παρὰ τὸ σέλας νέον ἔχειν[r].

g Eclogæ Physicæ, tom. i. p. 556. cap. xxvii. 1.

h vi. 1. 12. (Schneideri) De Signis.

i Ad Georgica, i. 211. But this is after Varro, De Lingua Lat. v. 53. Dicta bruma, quod brevissimus dies est.

k Ad Æneid. iv. 80.

l Phavorini Lexicon, μήν.

m Opp. pars ii. vol. ii. 56=409. 23. Cratylus, (Bekkeri, Berolini, 1817.)

n Etymologicum M. Σελήνη.

o Cleomedes, De Sublimibus, ii. v. 135, l. 2. (Bake, Lugduni Bat. 1820) which he further illustrates, ἐκ τοῦ ἐπιδίδοσθαι δᾷδας τοῖς εἰς τὰ Ἀρτεμίσια εἰσιοῦσι.

p Theodoret. Græcarum Affectionum Curatio, iii. § 45. p. 124 (e recensione Thomæ Gaisford. Oxonii, 1839.)

q Clemens Alex. Strom. v. vi. § 38. p. 28 l. 16.

r Lydus, De Mensibus, iii. 1. p. 27. l. 7. (Bonnæ, 1837.)

The division of time by the month then has its foundation in a natural motion, peculiar to itself. Its proper criteria and proper distinctions, both in the whole and in the parts, are the different sensible phenomena exhibited by the

The month is commonly described by the ancients as the lunar year.

> Μήσατο δ' ἄλλην γαῖαν ἀπείρατον ἥντε σελήνην
> ἀθάνατοι κλῄζουσιν, ἐπιχθόνιοι δέ τε μήνην·
> . . . .
> ὄφρ' ἐν μηνὶ τρέπῃ ὅπερ ἥλιος εἰς ἐνιαυτόν[s].

Orphica, Fragm. ix. Apud Proclum in Timæum, Δ. 685 = 283. B.

> Nec ratio solis simplex ac recta patescit,
> Quo pacto æstivis e partibus Ægocerotis
> Brumaleis adeat flexus, atque inde revortens
> Canceris ut vortat metas se ad solstitialeis:
> Lunaque mensibus id spatium videatur obire,
> Annua sol in quo consumit tempora cursu.

Lucretius, v. 613.

Sic mensis lunæ annus est intra quem cœli ambitum lustrat. nam et a luna mensis dicitur, quia Græco nomine luna mene vocatur[t]—Luna terris vicinior est quam sol: unde et breviori orbe celerius peragit cursum suum. nam iter quod sol in diebus CCCLXV. ista per triginta dies percurrit[u].—Tria sunt autem tempora annorum. aut enim lunaris annus est triginta dierum, aut solstitialis qui xii continet menses, aut magnus omnibus planetis in eumdem locum recurrentibus; qui fit post annos solstitiales plurimos[x].

Besides the *synodic* revolution of the moon, astronomers distinguish also the *sidereal*, which brings it back to the same star, or to the same point of the ecliptic supposed to be fixed; the *anomalistic*, which brings it back to the same extremity of the apsides of the lunar orbit (to the apogee, or to the perigee); the *draconistic*, which brings it back to the same node; and the *tropical* or *periodical*, which brings it back to the same equinox, or to the same point of the ecliptic supposed to be moveable or retrograde, (i. e. affected by the precession of the equinoxes). For the explanation of these distinctions we refer to the books on astronomy. Chronology has little to do with any revolution of the moon but the synodic, that is, from syzygy to syzygy; the opposition being included under the name of syzygy, (as it may very fitly be,) as well as the conjunction. And from syzygy to syzygy, in either of these senses, the moon has necessarily to move over thirteen signs or nearly so, and not merely over twelve; because in order to this syzygy it must again overtake the sun, or again come opposite to the sun; which itself generally moves through one sign while the moon is moving through twelve.

s Cf. Hyginus, Poëticῶν Astron. iv. cap. xiv; xix. Servius ad Æneid. i. 269; iii. 284.

t Macrobius, Somnium Scip. ii. xi. 161. Cf. Saturnalia, I. xiv. 268.

u Isidore, Origines, iii. 56. 29. G. Cf. De Natura Rerum, xix. 253. C. D.

x Id. Origines, v. 36; 41. G. H. De Natura Rerum, vi. 248. D. Taken from Servius ad Æneid. i. 269.

moon in the course of one and the same revolution about the earth; phenomena recurring in a regular order, and at regular distances of time asunder; sufficiently so at least, to answer all practical purposes as the means of distinguishing thereby the course and succession of time; and what is more, every where visible, and every where available for such purposes.

SECTION II.—*On the two principal modes of measuring the interval of time called the month; from the conjunction to the conjunction, or from the opposition to the opposition.*

The exact natural limit of this measure of time being one complete revolution of the moon about the earth; it is not essential either to the uninterrupted continuity or to the perpetual equability of the measure, that it should have begun from one state or condition of the moon in relation to the earth, more than from another. Nothing is essential but that it should always have begun and always have ended with the same; that from whatsoever state or condition of the moon in relation to the earth the motion itself began at first, to the same it should have returned after the proper interval of time, and from the same have begun again, perpetually.

There are however two forms of the appearances which the moon is constantly exhibiting in the course of its revolution about the earth, and two states of the relation in which the body revolving in this instance is continually seen to be placed with respect to the body about which it revolves, which are more remarkable and more significant than any others; and therefore are the best qualified to serve as indications of the beginning and of the end of one and the same revolution. One of these is that form of the lunar phasis in which the moon appears for the first time, just illuminated by the rays of the light which it derives from the sun. The other is that under which it appears for the first time, illuminated with all the fulness of the light which it derives from the sun. On each of these occasions too it is in a line of conjunction with the earth and the sun; only that on the first, the moon is on this line between the

earth and the sun; on the second, the earth is on this line between the moon and the sun.

The first of these forms of the lunar phases is called the new moon; and the second the full moon. It is from one or other of these phenomena, and from one or other of these two epochs in the course of the same lunar revolution about the earth, that the common sense of mankind has every where agreed to reckon this measure of time which we call the month. The definition of the measure is consequently every where the same; either that of the interval, measured in mean solar time and its parts, which is observed to elapse from one conjunction to another, or that of the interval, similarly measured, which is observed to elapse from one opposition to another*.

It makes no difference to the interval itself, which of these definitions is adopted. The absolute measure of this interval, and consequently the absolute length of the month, is the same in either case. But the definition which nature appears to have prescribed, (and that which men too have most generally adopted for themselves,) would seem to be the former. For the natural idea of the lunar revolution, as it is on every account to be presumed, must be agreeable to the natural order of the lunar phases; i. e. from the first visible perception of the new moon, through successive perceptions of regular additions to the amount and the intensity of the lunar light, up to the full itself; when both the quantity and the intensity of the light derived by the moon from the sun attain to their maximum: and after this, through successive stages of decrement and diminution in the lunar light, analogous to those by which it was gra-

* *Μήν ἐστι χρόνος ἀπὸ συνόδου ἐπὶ σύνοδον, ἢ ἀπὸ πανσελήνου ἐπὶ πανσέληνον*[y]. —*Ἐστὶ γὰρ μὴν χρόνος ἀπὸ συνόδου εἰς σύνοδον, ἢ ἀπὸ τῆς πανσελήνου ἐπὶ τὴν πανσέληνον. σύνοδος δέ ἐστι χρόνος ἐν ᾧ ὁ ἥλιος καὶ ἡ σελήνη ἐν τῇ αὐτῇ μοίρᾳ γίνονται*[z].—*Μὴν, χρόνος ἀπὸ συνόδου ἡλίου καὶ σελήνης ἐπὶ τὴν ἑξῆς σύνοδον*[a].—*Καλεῖται μὴν καὶ τὸ ἀπὸ συνόδου ἐπὶ σύνοδον χρονικὸν διάστημα, καὶ λοιπὸν ὁ τριακονθήμερος χρόνος*[b].—*Σελήνης ἡμέραι λʹ. οὗτος γὰρ ὁ τέλειος μὴν ἀπὸ φάσεως εἰς σύνοδον*[c].

[y] Geminus, vi. Uranologium, 31. B.

[z] Ibid. vii. 40. C.

[a] Phavorini Lexicon, *Μήν*.

[b] Cleomedes, De Sublimibus, ii. v. 135. 16.

[c] Plutarch, De Placitis Philosophorum, lib. ii. λβʹ. *περὶ ἐνιαυτῶν*.

dually increased before, down to the time when it is visible for the last time, prior to its total disappearance for a while, to be followed by its reappearance in the same form of the new moon as before*.

Such is the natural course of the lunar phenomena; and therefore the natural idea of the lunar month, as founded upon it. But whether the lunar measure of time was to be reckoned in this manner from the conjunction perpetually, or in the other from the opposition; is one of those questions which never could be decided with certainty, except by going back to the beginning of the lunar revolution itself. The law of the first revolution must determine every subsequent one. If the first of all set out from the conjunction, then every other must have done the same, and is still bound to do the same. This then is the question which would require to be decided first of all; viz. whether the first lunar revolution about the earth, in connection with the present system of things, *de facto* bore date from the conjunction or from the opposition, or from any state of the phasis between the two. And the only means of determining such a question, accessible to us, it is evident must either be positive testimony *ab extra* to the matter of fact, (which of course must be the testimony of Scripture, if it actually exists); or, (supposing the epoch ascertained for which the calculation was to be made,) a direct astronomical calculation; or lastly, (on the same hypothesis of the knowledge of the epoch of lunar time itself in connection with the present system of things,) the actual exhibition of all the actual revolutions of the moon about the earth, which have taken place from that beginning to the present day; traced back, on the principle of the *reditus retro*, from any revolution at present which might be fixed upon, but according to one

* *Μετὰ γὰρ τρεῖς ἢ τέσσαρας τοῦ γεννηθῆναι ἡμέρας φαίνεται* (sc. *ἡ σελήνη,*) *καὶ οὐχ ἅμα τῷ γεννηθῆναι· ἀνατέλλει δὲ οὐχ ὅλον τὸ φῶς ἔχουσα περιφερὲς, ἀλλὰ μηνοειδής. μέχρι δὲ τοῦ ἡμισέος αὐξηθεῖσα γίνεται διχότομος· ἐὰν δὲ τὸ δίμοιρον περιφωτισθῇ καλεῖται ἀμφίκυρτος. πληρωθεῖσα δὲ γίνεται πληροσέληνος καὶ πανσέληνος καὶ διχόμηνις, πεντεκαιδεκαταία γάρ ἐστι πληρωθεῖσα, ὅ ἐστιν ἥμισυ μηνὸς, διχαζομένων τῶν λʹ ἡμερῶν. καὶ πάλιν αὖ ἀπὸ τῆς πανσελήνου ἄρχεται μειοῦσθαι, καὶ γίνεται πρῶτον ἀμφίκυρτος, εἶτα διχόμηνις* (lege *διχότομος*), *εἶτα μηνοειδής.*—Achilles Tatius, Isagoge ad Arati Phænomena, § 21. Uranologium, 141. C. D.

and the same law, and that the proper law of each. By any one of these means might such a problem be determined, and with certainty; much more by all in conjunction, should it turn out that all concurred to decide it in the same manner, and that all led to the same result: of which more hereafter.

SECTION III.—*On the mean standard of the lunar revolution.*

1. *On the standards of antiquity.*

In reference to this question of the standard of the lunar revolution, we propose to do no more at present than to lay before the reader some actual measures of the kind; first those which appear to have been assumed in former times; secondly those which are proposed at present; and lastly that one in particular which will be found to be adopted in our own Fasti.

No definition of the lunar synodic revolution, in express terms, has come down from antiquity, older than the time of Hipparchus, or Geminus, or Ptolemy; each of whom may be considered comparatively modern. But there were various lunæsolar cycles in ancient times, some of them much older than the oldest of these three persons; the principles and construction of which being known, the lunar and solar standards, which must have been combined in such cycles, are known also, or may be discovered from them and enucleated out of them.

For some standard, both lunar and solar, must enter into every lunæsolar cycle; and whatsoever these standards were in any of these cases, it appears to have been the opinion of the authors of such cycles that they were fixed and invariable of their kind. It is a common characteristic of all such cycles, that having once been defined and settled, in conformity to their proper principles, they were proposed as perpetual measures of true lunar and solar time. No provision for their subsequent correction appears to have been made at the time of their publication; and therefore it is to be presumed that none was supposed to be necessary.

If therefore we know so much of the constitution of one of these cycles of antiquity, as to be able to specify the number of lunar revolutions which entered it, and the number

of mean solar or Julian days which entered it also, we have nothing to do but to divide the latter by the former, and we shall obtain the mean lunar standard of the cycle in the shape of the quotient; which, under these circumstances, will be the average length of each revolution of the cycle in mean solar or Julian days and parts of days. And this mean lunar standard of the cycle, under the circumstances of the case, in the opinion of the inventors of such cycles at least, must have been the standard prescribed by nature.

For example; There was an ancient lunar cycle among the Egyptians, to which chronologers have given the name of the Apis Cycle. This cycle consisted of 309 revolutions of the moon, and of 9125 mean solar days: in which respects it never underwent any change, nor ever deviated from the first principles of its construction, as long as it continued in use, though that was for more than a thousand years*. If then we divide 9125 by 309, we must get the mean length of every revolution in this cycle; and that too, according to the principles of the cycle itself, the mean standard of nature.

In like manner there was an ancient lunar cycle among the Greeks, (though not by any means so ancient as this Egyptian one,) called the Metonic; which having been once received into public use *there, where* it was first introduced, viz. Athens, was never afterwards corrected there, so long as it continued in use; which was for five or six hundred years at least. An error was involved in the first principles of this cycle, such that four cycles of the kind, instead of containing the same number of mean solar days as 76 Julian years, contained *one more*; that is, 27,760, instead of 27,759. But the number of lunar revolutions which entered these four cycles was never either more or less than 235×4, or 940. If then we divide 27,760 by 940, we must get the

* We state here merely the matter of fact, as it held good of the Apis cycle; the historical epoch of which, as we shall see hereafter, was B. C. 973. This cycle was never corrected even among the Egyptians; but notwithstanding that fact it would be a great mistake, (as we shall also see, we trust, hereafter,) to infer from it that the Egyptians, who instituted this cycle in B. C. 973, had not a correct idea of the true standard of the mean synodic lunation; and that it was something very different from that which results simply from the division of the number of days in the cycle by the number of lunations in it also.

actual lunar standard of this cycle; and that too, (as before observed,) in the opinion of Meton its inventor at least, the absolute standard of nature.

We prefer to arrive at the assumptions of the ancients on this point through their own application of their own conclusions in such cycles and calendars as these, which may even yet be analyzed and taken to pieces; rather than through the accounts which the learned have given of the same things: for these are frequently neither the same with each other, (though they profess to be accounts and explanations of the same things,) nor consistent with the conclusions obtained in the above manner; which nevertheless is the only authentic mode of arriving at the truth.

Mean lunar standards, deducible from the cycles of antiquity.

	B. C.	Days	Hours	Min.	Sec.	Th.	Fourths
i. Octaëteris, 2922 days, 99 revolutions	1261	29	12	21	49	5	27·272,727
ii. Nundinal cycle, 304 days, 19 half-revolutions	1100	32					
iii. Apis cycle, 9125 days, 309 revolutions	973	29	12	44	16	18	38·446,6
iv. Correction of the Octaëteris, 160 years' period, 58,441 days, 1979 revolutions	592	29	12	44	1	20	2·425,467
v. 59 years' cycle, 21,557 days, 730 revolutions	544	29	12	43	23	50	8·219,178
vi. Metonic cycle or Enneakaidekaëteris, 27,760 days, 940 revolutions	432	29	12	45	57	26	48·51
vii. Callippic correction of the Metonic, 27,759 days, 940 revolutions	330	29	12	44	25	31	54·893,617
viii. Hej'ra, 10,631 days, 360 revolutions*	A. D. 826	29	12	44			

* The above list may appear to be very incomplete, in comparison of the possible number and variety of lunar calendars which may be conceived. But should the present work ever be finished, the reader who shall accompany it to its conclusion will see, if we mistake not, that in this list, short as it seems, the general form and type, though not the specific and individual distinctions, of almost every lunar measure of time, which was actually in use among mankind at any period of their existence, are in reality comprehended.

If there was a primitive lunar as well as a primitive solar calendar, (of which more, we trust, elsewhere,) it must have been the Apis cycle. The

SECTION IV. 2.—*Modern standards of the same kind.*

We subjoin in the next place some few of the similar standards which have been proposed in modern times, and are so at present.

ancient Hindus, from B. C. 946, had the Metonic cycle in the shape of the period of 304 years = 16 such cycles; or of that of 247 years = 13 Metonic cycles. The Japanese had this cycle from B. C. 660 downwards; the Chinese from B. C. 657. The Siamese lunar calendar, so ingeniously analyzed by Cassini the elder, was nothing different from the Metonic. The Tatar or Cathayan, described by Ulugh Begh, was modelled upon the Chinese. In ancient Italy the oldest form of the lunar calendar discoverable was the Nundinal. From the time of Numa Pompilius the Roman calendar was based on the Octaëteris. The Octaëteris was the first and oldest lunar cycle among the Greeks. This cycle in its simple form; the 59 years' cycle; the period of 160 years, peculiar to the Octaëteris; the vulgar Metonic cycle, and the Callippic correction of the Metonic: these are, *de facto*, all the lunar cycles, or forms of the lunar calendar, discoverable among the Greeks. The Paschal cycles of Christian antiquity were either the simple Octaëteric; or the double Octaëteric, (that is, the 16 years' cycle;) or the Metonic regulated by the Callippic correction; or the Octaëteric engrafted on the Metonic, in the shape of the period of 84 years, (a cycle made up of four Metonic cycles and of one Octaëteric cycle;) and in one instance of which we ourselves are aware, (and possibly in more with which we are not yet acquainted,) the Apis cycle. The Arabians, before the time of Mahomet, had a lunar calendar which was Metonic, and subject to the Callippic regulation in general; though modified in a manner peculiar to itself. The modern Jewish calendar has never been any thing but Metonic in principle. The nations of the north of Europe, (our ancestors in Britain at least, and their contemporaries in Gaul, and as we believe in Spain also,) had a lunar period of 30 years; the principle of which, and its relation to the primitive solar year, *mutatis mutandis*, was the same with that of the Apis cycle. Besides this, and after this, they had very generally the Octaëteris; but we have not discovered any clear proofs of the Enneakaidekaëteris, or 19 years' cycle, among them also, at least as yet: though we think it far from improbable that it was known to them, and that somewhere or other it may still be found among them. The nations of Spanish America, when the Spaniards first came among them, had their peculiar lunar periods too; particularly one of 312 years, the principle of which was much the same as that of the Apis cycle.

It would not be proper to reckon the Chaldaic Saros, as it is commonly called, among the number of the lunar calendars of antiquity; but it may very properly be enumerated as one of the lunar cycles of antiquity, and as one of the most exact of all too; since it possessed the property of bringing round the same ecliptic conjunctions and ecliptic oppositions, if

Mean Lunar Standards of modern times.

	Days	Hours	Min.	Sec.	Th.	Fourths	Fifths
Tabulæ Prutenicæ	29	12	44	3	38	48	
Tycho Brahe, Newton	29	12	44	3	9		
Tabulæ Alphonsinæ	29	12	44	3	3		
Pound	29	12	44	3	2	58	
Bailly, Delambre, Ideler ..	29	12	44	3			
Tobias Mayer	29	12	44	2	53	23	25
Baily, Herschel	29	12	44	2	51	56	
La Place	29	12	44	2	47	56	54
Brett	29	12	44	2	12		
Biot	29	12	44	2			
Kennedy	29	12	44	1	45		

We shall confine ourselves to one observation upon these two classes of standards of the same kind; viz. That if the modern appear to differ widely from those of antiquity, this discrepancy is not to be attributed altogether to some mixture of error involved in the latter, as might be suspected at first sight; because, in the case of the lunar revolution about the earth, the natural standard itself always has been, and still is,

not perpetually yet for a very long time: particularly the same lunar eclipses. The discovery of this cycle is generally attributed to the Chaldees of antiquity. In our opinion it was first discovered and digested by the Egyptians; and was first applied to its proper use and purpose in Egypt: but not before B. C. 848. The grounds of this opinion will be stated in a future part of this work, if we are permitted to get so far with it.

The number of lunar revolutions contained in the saros is 223. The number of mean solar days and nights is 6585 = 18 Julian years and 11 days, if there are only four leap years in these 18 years, and to 18 years 10 days, if there are five. Besides this number of integral days and nights, or periods of 24 hours of mean solar time, which entered the saros, there was a surplusage of mean solar hours too, of not less than seven, nor more than eight; with respect to which, we do not know for certain in what manner they were assumed by the original contrivers of the saros, whether at seven or at eight, or at something between the two. The Chaldees, who tripled the saros to get a round number of integral days, (6585 × 3 + 1, = 19,756 days and nights,) must have assumed them at 8 hours exactly[d]. On this principle, the average length of each lunation of the period was

$$\frac{6585\text{ d. } 8\text{ h.}}{223} = \overset{\text{d.}}{29}\ \overset{\text{h.}}{12}\ \overset{\text{m.}}{44}\ \overset{\text{s.}}{7}\ \overset{\text{th.}}{32}\cdot017{,}937{,}2.$$

[d] Cf. Ptolemy, Magna Compositio, Opp. i. 215. lib. iv. cap. ii.

subject to a constantly-increasing diminution of its period; so that the most correct expression of that natural standard, some thousand years ago, would only differ so much the more from the most correct at present. On this subject however we hope to have an opportunity of entering on the necessary explanations hereafter.

SECTION V.—*Of the mean lunar standard of the Fasti Catholici.*

The standard of the mean lunar synodic revolution, adopted in the system of time of which we are about to give an account, briefly defined and stated, is that which is obtained from the Hipparchean period of 304 mean or actual Julian years. In this period, there are 111,036 mean solar or Julian days; but the law of the mean lunar revolution through one such period requires one day less than that number. The sum of mean or actual lunar synodic revolutions, which enters it also, is 3760. If therefore we diminish 111,036 by unity, and divide the remainder by 3760, we shall obtain the average lunar standard of the period; which, as already observed, is the fixed and invariable mean Lunar standard of these *Fasti**.

$$\frac{\overset{\text{d.}}{111{,}035}}{3760} = \overset{\text{d.}}{29}\ \overset{\text{h.}}{12}\ \overset{\text{m.}}{44}\ \overset{\text{s.}}{2}\ \overset{\text{th.}}{33}\ \overset{\text{f.}}{11}\ \overset{\text{f.}}{29}\ \overset{\text{s.}}{21}\ \overset{\text{sev.}}{42\cdot127{,}659{,}574{,}468}.$$

$$= \overset{\text{d.}}{29}\ \overset{\text{h.}}{12}\ \overset{\text{m.}}{44}\ \overset{\text{s.}}{2}\ \overset{\text{th.}}{33\cdot191{,}489{,}361{,}702{,}127{,}659}.$$

$$= \overset{\text{d.}}{29\cdot530{,}585{,}106{,}382{,}978{,}723{,}404{,}25}.$$

* If Hipparchus was really the discoverer of this period, and of its property, as he appears to have been, it might be supposed that the true lunar standard of Hipparchus must have been the same with that which results from the analysis of this period.

The mean lunar standard is stated by Geminus as follows[e]: *Ἔστι γὰρ ὁ μηνιαῖος χρόνος ἀκριβῶς λαμβανόμενος ἡμερῶν κθ′, καὶ πρώτων ἑξηκοστῶν λα′, καὶ δευτέρων μ′, καὶ τρίτων ν′, καὶ τετάρτων κδ′.* That is, in the sexagesimal division of antiquity, 29d. 31′ 40″ 50‴ 24⁗; or as Petavius reads, 29d. 31′ 50″ 8‴ 20⁗: which in the modern notation = 29d. 12h. 44m. 3s. 20th. And this it appears was the standard adopted by Ptolemy also[f]; but *after* Hipparchus. Hipparchus however, as it further

[e] VI. Uranologium, 36. D. Cf. VI. 31. C. 36. A: VII. 40. B, C: and the notes of Petavius, p. 412.

[f] Opp. i. Magna Compositio, iv. ii. 217. iii. 223; see however Bailly, Astronomie Indienne, ch. x. §. 40. p. 297. ed. 1787.

CHAPTER III.

On the measure of time by the year.

SECTION I.—*Conditions required for this measure.*

The third and the most comprehensive of the natural measures of time is that which is every where called the year; and besides or distinct from this *we* recognise no other.

The natural cause of this measure too is a natural motion; the motion of the earth in space about the sun, or, as it appears to the eye of sense, the motion of the sun about the earth. The pathway in the heavens, in which this motion is observed to be perpetually going on, is called the Ecliptic; and the ecliptic itself is divided conventionally into twelve equal parts, called signs; and each of these signs is divided into thirty equal parts, called degrees: and consequently the whole ecliptic is divided into 360 degrees.

The natural annual cycle therefore is this cycle of the ecliptic. And were the continual round of the earth or of the sun in the ecliptic, and nothing more, supposed to constitute the year; the definition of the year would be nothing more than the stated and regular interval of time, measured by mean solar days and their parts, which had been or might be observed to elapse, between the departure of the sun from a given point of the ecliptic and its return to the same again.

But if the year is to be regarded as something more than the mere circle of the ecliptic; if it is to be considered the cycle of the seasons also; if this natural interval of time,

appears from Ptolemy loc. cit., obtained this standard from the division of the larger ecliptic period of 344 Julian years, 361 days, 1 hour, or 126,007 days, 1 hour, by the number of lunations contained in it, 4,267. Yet 126,007 days, 1 hour of mean solar time, divided by 4,267, give only 29d. 12h. 44m. 3s. 15th.: so that Hipparchus' solar period must really have contained 5m. 55s. 35th. of mean time more than 126,007 days 1 hour; for that just makes up the difference in each lunation between 29d. 12h. 44m. 3s. 20th. and 29d. 12h. 44m. 3s. 15th.; viz. 5th.

which is every where called the year, is synonymous with the *tropical* year, and with the cycle of changes and phenomena successively exhibited in that: nature itself has designated the epochs of such a cycle in a manner which never has been, nor ever could have been, mistaken.

The cardinal points of the ecliptic being assumed to be those which divide the tropical year into the four seasons, viz. the vernal equinox, the summer solstice, the autumnal equinox, and the winter solstice respectively; the length of the year is the interval, measured by days and nights of mean or uniform length, which has been or may be observed to elapse, between the departure of the sun from some one of these four points and its return to it again. It makes no difference to this length which of these points is fixed upon as the epoch, or point of departure. The absolute interval between one of these departures and one of these returns, measured as above, is the same in each of these cases. It is necessary only to a constant succession of this kind, and to a perpetual measurement of time founded upon it, that from which soever of these four points the first revolution of the kind is supposed to have begun, to the same it should be supposed to have returned, and from the same to have begun again, perpetually. It is essential to it also that the interval between any one of these departures from the epoch, and any one return to it again, which are only consecutive, and properly speaking the first of each kind itself, once fixed and determined, should ever after be considered invariable; or, what amounts to the same thing, that all the actual intervals of this kind, which may have elapsed since the beginning of the whole succession, should be referred to some unalterable standard of the succession itself; a standard from which the actual interval may vary within certain limits in particular instances, but which can never vary from itself.

The most important questions then, with which we are concerned, by way of preliminary, in reference to this part of our subject, are obviously these two: first, what is the proper beginning of the whole of that natural course and succession, which is called the cycle of the natural year? And secondly, what is, or what has been, the proper measure,

the fixed and invariable standard, both of the whole and of the parts of the succession perpetually? An answer, we trust, will be returned in due time to the first of these questions; and one which, as we also trust, will be satisfactory. At present we pass to the second, and to the proper answer which is necessary to be returned to that.

SECTION II.—*On the various measures of the natural or tropical year, ancient and modern.*

It has been remarked by Bailly, that the determination of the length of the natural solar or tropical year, with a certain degree of precision, is the master-piece of astronomy. "La détermination de la durée de l'année solaire, quand elle est portée à une certaine précision, est le chef-d'œuvre de l'astronomie perfectionnée: elle est au moins celle qui dépend le plus du temps[g]." Whether he is right in assigning the determination of this problem the highest place among the operations of astronomy, we do not undertake to say: but as to the interest which the problem has always excited, the length of time for which it has engaged the attention of curious and inquisitive observers in all parts of the world, and the many attempts which have been made to solve it; no assertion was ever more fully borne out by experience and the matter of fact. And we may form some idea of the delicacy and of the difficulty of the problem itself, from the number, the variety, and the difference of the results to which these attempts to solve it *de facto* have led.

We have made a point of collecting all such statements of the length of the tropical year as happened to fall in our way, and were not too indefinite to admit of being precisely understood*: and though much still requires to be said on

* It is necessary to draw this distinction; since allusions to the length of the natural year occur in the writings of the ancients, which shew that they had general ideas on this subject more or less correct; but which are not sufficiently explicit to enable us to say what their particular opinions about it must have been.

Autolycus, an ancient author on astronomy, of whose opinions Delambre gives some account[h], and whose age he fixes conjecturally to B. C.

[g] Astronomie Indienne et Orientale. Discours Préliminaire. Troisième partie, p. cxlvii.

[h] Histoire de l'Astronomie Ancienne, Paris, 1817, tom. i. chap. ii. pp. 18–48, cf. p. 18. chap. i., and p. 26. chap. ii.

this subject, and much which concerns the first principles of our own system of time; we think it better to postpone these further and more particular discussions for the present,

300, appears to have estimated the length of the natural year at 365 days: which is something extraordinary in a Greek writer on the subject of astronomy later than Meton, Eudoxus, and Callippus; from each of whom he might have learned a very different doctrine on this point, and one much nearer to the truth.

From the time indeed of the publication of the correction of the cycle of Meton by Callippus, the general opinion of scientific men among the Greeks appears to have been that the standard assumed in the Callippic correction, the standard of the mean Julian year, was the true standard of the mean natural year also. At least we find Geminus[i] and Cleomedes[k] still of this opinion; though Hipparchus had already pointed out the error involved in it 70 or 80 years before the time of the former.

It is a singular fact too, that even the standard of Meton, which was as much in excess of the standard of Callippus as that was of the mean natural one, (or even more so,) is still proposed by Africanus in the third century of the Christian æra, as the true standard of the natural year. It is still more remarkable that an author should be found writing in A. D. 640, (of whom we shall probably have to give an account on a future occasion,) and yet seriously assuming that the excess of the natural year over 365 days and nights was not more than 2 hours and 30 minutes. Even Epiphanius is not to be excused either from some misapprehension on this point, or from some ambiguity of language concerning it, as if the mean natural or mean Julian year consisted of 365 days 3 hours only; though he may certainly be understood as if he reckoned each of these three hours equal to two. This was however an actual standard, viz. that of Aphrodisius; as we learn from Censorinus.

Galen, on the contrary, though master of all the learning, all the philosophy, and all the science of his day, and writing as late as A. D. 170, or thereabouts, makes the year consist of 365 days, and *more* than 6 hours, not less[l].

In general however all educated persons, both Greeks and Romans, about the beginning of the Christian æra, had a sufficient idea of the truth on this point. Circuitus enim solis orbium v et lx et ccc, quarta fere diei parte addita, conversionem conficiunt annuam[m].—Quanto illa majora sunt, quod sol totidem ut ita dicam gradus quot dies habet, et annum circuitu suo claudit[n].—Nam cum trecentis sexaginta et fere sex partibus orbis solis ex circuitu ejus patere appareat[o], etc.

i Geminus, cap. vi. Uranologium, 38. B.

k Cleomedes, i. vi. p. 37. 9.

l Opera, (Kühn.) xviii. Pars ii. 240. Εἰς τὸ Ἱπποκράτους προγνωστικόν. Γ. iv. Cf. Gaza, De Mensibus, x. Uranologium, 298. B.

m Cicero, De Natura Deorum, ii. 19, 49.

n Seneca, Opp. v. (*Ruhkopf.*) Naturalium Quæst. vii. 1. 3.

o Pliny, Hist. Nat. ii. 21. (Harduini et Franzii, Lipsiæ, 1778.) Cf. Scholia ad Arati Phænomena, 550–552, and e Cod. Mosquensi ad v. 550. p. 312.

and in the first place simply to lay before our readers the collection in question, premising merely that it is far from complete, (as many of them probably will be aware;) and in the next to define, or state in express terms, the standard which has been adopted in these Fasti.

SECTION III.—*Standards of the natural or tropical year, both ancient and modern.*

	Days	Hours	Min.	Sec.	Thds.	Fths.	Fifths.
i. Œnopides of Chios[a]	365	$\frac{22}{59}$					
	365	9					
ii. Harpalus[a]	365	13					
	365	12[a]					
iii. Philoläus of Croton[a]	364	12					
	365	12[b]					
iv. Aristarchus of Samos	365	$\frac{1}{1623}$[a]					
	365	$\frac{1}{17}$					
	365	5	50	32[c]			
v. Aphrodisius[a]	365	$\frac{1}{8}$					
	365	3					
vi. Ennius[a]	366[c]						
vii. Meton[a]	365	$\frac{5}{19}$	$\frac{120}{19}$				
	365	6	$\frac{1}{76}$				
	365	6	18	56	50	31	34[d]
viii. Callippus[a], Geminus, Cleomedes	365	6					
ix. Hipparchus[a], Ptolemy	365	5	55	12[e]			
Lunæsolar period of 304 years[f]	365	5	55	15			
x. Cassini, from the observations of Hipparchus[g]	365	5	48	49			
xi. Chaldean or Babylonian	365	5	50	43[h]			
	365	5	50	28[i]			
	365	5	49	30[k]			
	365	5	54	31[l]			
xii. Chinese	365	5	50	46[m]			

[a] Censorinus, De Die Natali, xix. Delambre, Astronomie Ancienne, i. 298. Scaliger, De Emendatione, i. 17. B: ii. 68. C. (Coloniæ Allobrogum, 1629.)

[b] Ideler, Greek Chronology.

[c] Bailly, Mémoires de l'Académie des Sciences, 1773, p. 175.

[d] Beveridge, Institt. Chronologicæ, ii. vii. § i. 182, (Londini, 1781.) Ptolemy Opp. i. Magna Comp. iii. ii. 163, 164.

[e] Ptolemy, Opp. i. Magna Compositio, iii. cap. ii. 165. Scaliger, De Emendatione, iv. 273. C. Cassini, Mémoires de l'Académie des Sciences, tom. viii. 264, Ann. 1699. Bailly, Astronomie Indienne, clxix. Histoire de l'Astronomie Moderne, liv. iii. § viii. tom. i. 85. Delambre, Astronomie Ancienne, i. 412, liv. ii. chap. ii.

[f] Ideler, Greek Chronology.

[g] Delambre, Astronomie Ancienne, tom. ii. 114.

[h] Bailly, Astronomie Ancienne, liv. v. § xv. 149. Mémoires de l'Académie des Sciences, Ann. 1773, p. 175.

[i] Delambre, Astronomie Anc., i. 412. liv. ii. chap. ii.

[k] Fréret, Mémoires de l'Académie des Inscriptions, xvi. 214. Bailly, Astronomie Ancienne, Éclaircissemens, liv. iv. § xxxii. p. 382.

[l] Bailly, Astronomie Indienne, Dis. Prél. cxlix.

[m] Delambre, Hist. de l'Astron. i. 417. liv. ii. chap. ii.

	Days	Hours	Min.	Sec.	Thds.	Fths.
Chatayan	365	5	50[n]			
xiii. Indian	365	5	50	35[o]		
	365	5	50	54[p]		
xiv. Siamese	365	5	50	35[q]		
	365	5	55	13	46[r]	
xv. Rabbi Adda, and the Jewish Calendar	365	5	997	48 or $\frac{997}{1080}$ $\frac{48}{76}$ [s]		
	365	5	55	26[r]		
xvi. Gelalæan Correction	365	5	50[t]			
	365	5	49	31[u]		
	365	14′	32″[v]			
	365	14′	33″	7‴	32⁗[x]	
	365	5	49	15	0	48[y]
	365	5	49	15[z]		
	365	5	48	53	20[a]	
	365	5	49	3	30[b]	
{	365	14′	32″			
{	365	5	48	48[c]		
	365	5	48	32[d]		
	365	5	48	52[u]		
xvii. Alphonsine Tables	365	5	49	56[e]		
	365	5	49	16[f]		
xviii. Copernicus	365	5	49	26	23[e]	
	365	5	49	6[g]		
xix. Tabulæ Prutenicæ	365	5	49	15	46[h]	
xx. Gregorian Correction	365	5	49	12[i]		
xxi. Bouillaud	365	5	49	4[g]		

[n] Bailly, Mémoires de l'Acad. des Sciences, Ann. 1773, p. 175. Hyde, De Religione Vett. Persarum, xviii. 217. (Oxonii, 1760.) Ulugh Begh, Epochæ Celebriores, vi. sect. ii. p. 50. (Londini, 1650.)

[o] Bailly, Astronomie Indienne, Discours Prél. xxxix. and ch. v. 159.

[p] Delambre, Astron. Anc., i. 412. liv. ii. chap. ii. Bailly, Astron. Anc., liv. iv. § xv. 110. Mémoires de l'Académie des Sciences, Ann. 1773, p. 171.

[q] Bailly, Astronomie Indienne, Discours Préliminaire, p. viii.

[r] Cassini, Mémoires de l'Académie des Sciences, Ann. 1699, tom. viii. p. 264. Bailly, Astronomie Indienne, ch. i. § xxxi. p. 25.

[s] Maimonides, De Ratione Intercalandi, 382. cap. x. § 1. and cap. ix. § 4. p. 378. (De Veil. Londini, 1683.) Scaliger, De Emendatione, Proleg. pag. vi. : i. 17. B.

[t] Bailly, Astron. Anc. Éclaircissemens, iv. § ii. 354.

[u] Boyer, Traité du Calendrier, chap. xxv. 156. (Nantes, 1822.)

[v] Hyde, De Religione Vett. Pers. xvii. 209.

[x] Ulugh Begh, Epochæ Celebriores, cap. v. p. 44.

[y] Beveridge, Institt. Chron. i. xi. vii. p. 69. L'Art de vérifier les Dates, Diss. &c. xli. § vii. note 1.

[z] Ideler, Persian Chronology.

[a] Scaliger, De Emendatione, i. 17. D: vii. 773. A.

[b] Bailly, Astronomie Mod. i. Éclairciss. liv. v. § xxxii. 606.

[c] Shah Cholgius, apud Hyde, De Religione Vett. Pers. xvii. 209.

[d] Delambre, Connaissance des Temps, An. 7. de la République, (A. D. 1798.) Boyer, ut supra.

[e] Blondel, Histoire du Calendrier Rom. part. iii. liv. i. ch. iii. p. 162, Paris, 1682.

[f] Scaliger, De Emendatione, iv. 309. C: vii. 775. B: cf. i. 17. D. Bailly, Astronomie Indienne, Disc. Prél. cxlvii.

[g] Bailly, Astronomie Indienne, Discours Préliminaire, lxii. and ch. vi. § vi. p. 161.

[h] Scaliger, De Emendatione, i. 17. D.

[i] L'Art de vérifier les Dates, Dissertation &c. xxx. § xvii. note 1 : xxxiii. § xx. note 1.

	Days	Hours	Min.	Sec.	Thds.
xxii. Cassini	365	5	49	0	53[i]
	365	5	48	52	30[g]
xxiii. La Hire, Carouge, Kennedy[k]	365	5	49[i]		
xxiv. Kepler, Newton, Flamsteed	365	5	48	57	30[g]
xxv. Le Monnier	365	5	48	57[g]	
xxvi. Longomontanus[l], Halley[g]	365	5	48	55[l]	
xxvii. La Place[m], Delambre[n], Biot[o]	365	5	48	51	36
	365	5	48	51·6	
	365·242264				
xxviii. Mayer	365	5	48	51[g]	
xxix. La Lande[p], Antonio Leon y Gama[q]	365	5	48	50	
La Lande	365	5	48	48[p]	
	365	5	48	45	30[g]
	365	5	48	45[r]	
xxx. La Place[s], Baily[t], Herschel[u]	365	5	48	49	42
	365	5	48	49·7	
	365·2422419				
	365·2422414				
xxxi. La Caille	365	5	48	49[x]	
	365	5	48	48[y]	
xxxii. Ideler	365	5	48	48[z]	
xxxiii. Bessel	365	5	48	47·55[a]	
	365	5	48	47·65[b]	
	365	5	48	47·81[c]	
	365·242220013[c]				
	365·242217[a]				
	365·2422181[b]				
xxxiv. Bailly	365	5	48	45	30[d]
xxxv. Tycho Brahe[d], Art de vérifier les dates[y]	365	5	48	45	
xxxvi. Riccioli	365	5	48	40[d]	
xxxvii. Albatagnius[e]	365	5	46	24	

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k Chronology, p. 121, 4to. London, 1762.
l Beveridge, Institt. Chron. ii. ii. § x. 142.
m Systême du Monde, p. 16. (Paris, 1813.)
n Astronomie, vol. ii. ch. 24.
o Astronomie Physique, iv. § 28. p. 48: § 43. p. 63.
p Mémoires de l'Académie des Sciences, An. 1782, p. 277.
q Saggio dell' Astronomia, Chronologia, e Mitologia degli antichi Messicani, p. 33, parte prima, § 9. (Roma, 1804.)
r L'Art de vérifier les Dates, Dissertation &c. p. xxxvii.
s Systême du Monde, liv. i. ch. iii. p. 29: 33: fifth edition, 1824, 8vo.
t Collection of Tables and Formulæ, p. 16.
u Outlines of Astronomy, A. D. 1849, chap. vi. § 383. p. 226.
x Cf. Delambre, Hist. de l'Astron. i. 412, liv. ii. ch. ii. Bailly, Astron. Ind., Disc. Prél. p. lxii.
y L'Art de vérifier les Dates, p. xxxvii. z Chronology, i. 35.
a Nautical Almanac, Explanations: p. xxii. of each month.
b Francœur, Astronomie Pratique, (1830.) § 73. p. 87, 88: § 263. p. 384.
c Tables and Formulæ of the late F. Baily Esq., p. 270.
d Bailly, Astronomie Indienne, Discours Préliminaire, lxii.
e Delambre, Hist. de l'Astron. i. 412. liv. ii. ch. ii. Blondel, Calendrier Romain, part. iii. liv. i. ch. iii. p. 162. Bailly, Astronomie Moderne, tom. i. Éclairciss. liv. v. § xix. p. 594.

SECTION IV.—*Standard adopted in the Fasti Catholici.*

The standard of the natural year, the fixed and invariable measure of the cycle of the mean solar or tropical year, adopted in this system of time which we call Fasti Catholici, and incorporated with our tables from first to last, is that of 365 mean solar days and nights, and 5 hours, 48 minutes, 50 seconds, 24 thirds of mean solar time of one more: that is,

365d. 5h. 48m. 50s. 24th.; or,
365d. 5h. 48m. 50s·4; or,
365d·24225.

This is the simple statement of the matter of fact: and with that we must be content for the present. What reasons there may have been to induce us to fix on this standard, which appears in terms nowhere in the list proposed above; and what claims this one in particular may possibly advance to be considered the true mean standard of nature; especially whether this (and this only) may not be the standard required by the necessity of the case for the constant succession of actual natural annual time in constant connection with actual civil, and may not have been both contrived and prescribed by nature for that purpose: these are grave and important considerations, and very essential for our own satisfaction and for that of our readers; but they are necessarily reserved for a different time and opportunity, when we shall be better prepared to enter upon them.

And now, having briefly considered the three natural measures of time which constitute the elements of pure chronology; and having summarily also but distinctly explained what is to be understood, from this time forward, by each of those measures, both as agreeable to the nature of things and as recognised in these Fasti; we must proceed to consider the conventional, positive, or civil substitutes for these natural measures, which constitute the elements of mixed chronology in contradistinction to pure: and in particular to designate and explain those positive or conventional measures which will be found to be substituted for the natural in these Fasti: what are the limits, which we have prescribed to the liberty of substitution itself; and what is the relation between the natural prototype and the artificial antitype which will be seen to have been established at first, and to be maintained and kept up perpetually afterwards.

DISSERTATION III.

Elements of mixed Chronology.

CHAPTER I.

SECTION I.—*On the substitution of civil for the natural measures of time in general.*

IT has been already asserted[a], that though there are three measures of time, and each of these is an appointment of nature; yet in reality the natural measures have never been the actual measures of time any where. A different form of the day has been universally substituted for the natural. A different form of the month and a different form of the year have every where taken the place of the natural.

The fact of this substitution is undeniable; and the truth of the assertion may be taken for granted. No exception to the universality of this rule is discoverable in former times. And if any appears to be discoverable in modern, it is confined to certain calendars, the Chinese, the Hindu, and the Persian; and it would be easy to shew, even of these cases of exception, that, whatsoever they may be in theory, in effect and in practice they are no exceptions at all; they come within the scope and comprehension of a common rule, as much as every thing else of the same kind. It may be laid down therefore as a general conclusion founded on the broadest possible basis of induction, that civil time never has been, nor ever could be, regulated any where, systematically and perpetually, except by civil measures.

With reference then to this particular process of the constant measurement and administration of time; it would seem, at first sight, as if nature had prescribed one method of proceeding, and men had every where followed another. Must we infer from this fact that men have every where

[a] Dissertation i. ch. i. sect. xv. p. 38.

and from the first conspired to act contrary to the dictates and appointments of nature? and as if arbitrarily, capriciously, and on purpose, have determined to observe one rule, because nature itself appeared to have suggested another?

The supposition would be absurd. Mankind would every where exclaim against it. The very substitutes, which they have put in the place of the measures of nature, would protest against it: for these substitutes themselves, instead of pretending to be independent of the constitutions of nature, have always professed to be founded upon them; to be, if possible, only facsimiles and representations of them. The existence of such facsimiles and representations every where is an avowed and deliberate recognition of the original forms, the archetypal models of nature. The very substitution of artificial measures of time for natural has been an act of submission to the ordinances of nature; the homage which civil time has every where done to natural. There must be some other reason for this general concurrence and practice of men. And we cannot do better than begin with inquiring into it.

SECTION II.—*On the reasons of this substitution. The natural measures prior to and independent of the civil. The civil posterior, and necessarily accommodated, to the natural.*

Now whatsoever other reasons there may have been to produce this concurrence; the first and the principal reason, the ultimate foundation of all the necessity, and of all the conviction of that necessity, which has led to the substitution of civil for natural measures of time every where, upon reflection will appear to be this *one* fact; viz. that the natural measures of time were prior to civil every where; that the natural measures had all been defined and laid down by nature before they could possibly be altered or modified by man; that the natural measures were all in being, and all going on in conjunction, yet each in obedience to a law and a rule of its own, before human society, and much less any thing which is resolvable solely into the constitution of human society, was yet in existence.

It follows that the three natural measures, having thus been associated together from the first, were running one

into another, and were complicated one with another, from the first; the larger including the less, and the less being comprehended in the larger. This was the constitution and system of things, both in the parts and in the complex, which human society found already established when it came into being. It was an *actual* state of things, which left no alternative, nor room for choice. Human time might be founded on this; but it must be subordinated to it. It could consist of no elements but those of this. Its elements could be put together and compounded in a system of their own, in no manner different from the mixture and composition of those of this. If the cycles of the year, of the month, and of the day respectively, were entering alike into this system of nature, and entering perpetually, yet each according to its proper law; they must enter alike into the system and scheme of human time, and each perpetually, and each in obedience to its proper law also Accordingly, the constitution of human or civil time has been the same every where; and, as we have already observed[b], the definition of civil or calendar time, in contradistinction to natural, is universally to the same effect; the continuous reckoning of days and months and years by a positive rule of some kind; but of all in conjunction, and of each in conformity to a proper law of its own, (whether the natural law of the same thing or not,) perpetually.

SECTION III.—*Objection, from the matter of fact at present, relating to menstrual time, or the measure of time by the month.*

It is no ground of objection to the truth of this definition, or to the universality of its application, that, according to the reckoning of calendar time which prevails in most instances at present, and which prevailed also very generally in former times, two only of the natural measures, the noctidiurnal and the annual, appear to be included in the constitution of civil or calendar time. For though the reckoning of the month does enter the calendar at present, and always did so; and though such a thing as the constant reckoning of noctidiurnal and annual time, without including menstrual also, would be singular, and almost impossible; yet it is

[b] Dissertation i. chap. i. sect. xv. p. 39.

notorious that the calendar reckoning of time in terms of the month at present, in most instances, is in terms of the solar and not of the lunar month. It is equally undeniable that such was the case in former times also; and on quite as large a scale. And yet it has been already observed[c], that the true reckoning of time in terms of the month from the first must have been in terms of the lunar and not of the solar month.

There is one modern calendar notwithstanding, in which the reckoning of monthly time still proceeds according to the natural rule, and that is the calendar of Hej'ra[d]; a calendar, which in point of extent and circulation may dispute the palm of precedence even with the Julian. There are other calendars in the east, at the present day, in which civil menstrual time is still reckoned according to the moon; as in India and in China. And even the Christian calendar of modern times, whether the Julian or the Gregorian, though for all civil or secular purposes professedly and ostensibly solar, yet for religious or ecclesiastical purposes has a lunar reckoning incorporated with this solar one, and interwoven with the texture of the civil calendar perpetually.

We are willing however to concede the objection in point of fact; viz. that the calendar reckoning of monthly time, at present, is kept in terms of the solar and not of the lunar month; and was so in repeated instances formerly likewise: and yet our proposition will still hold good, that the only true natural measure of monthly time is by the course of the moon, and not by that of the sun; and the inference from it will continue the same, that the only true actual measure of monthly time from the first must have been by the course of the moon, and not by that of the sun. For as to the matter of fact, i. e. the apparent neglect and omission of this measure of time in some forms of the civil reckoning of time in general both anciently and still; is any one prepared to deny that, whether taken into account in the calendar along with the other two measures perpetually or not, this measure of time too must have been going on in one

[c] Dissertation ii. ch. ii. sect. i. pp. 58, 59. [d] See the Introduction to the Tables, part i.

and the same way, along with the other two? And must not this be the case still, whether this particular measure of time enters the civil succession and civil reckoning of time formally and under its proper name, or not? Is it possible, in short, that things which began with being joined in a certain way by the appointment of nature, and which set out in conjunction at first, can ever have been separated since, or ever have ceased to accompany each other? If not, this omission, in some forms and varieties of the civil calendar, anciently or at present, of the actual reckoning of lunar time along with the other two, must be regarded as accidental; and can make no difference to the matter of fact, that all three measures, having once been united by nature, and once set in motion together, cannot have ceased to go on together also.

As to the solar in contradistinction to the lunar month; men cannot dispense with the menstrual division of time, any more than with the noctidiurnal or with the annual; and therefore they must have the month in some form or other. But they may please themselves whether it shall be the lunar or the solar month; or rather whether they shall know it by the name of the lunar or by that of the solar month. For, in strictness, there is no such thing as the solar month; because there is no such thing as the monthly description of the circle of the ecliptic by the sun. The circle of the ecliptic is *one*; complete and entire in the whole, not in the parts: consequently in the solar year, not in the solar month. We cannot conceive the heavens divided into twelve minor ecliptics called signs; though we may conceive the ecliptic divided into as many equal spaces or portions of itself, called by that name, as we please. But the division of the great circle of the ecliptic into twelve equal parts, called signs, is merely analogous to that of the diurnal revolution into twenty-four equal parts, called hours; and to say the solar year is made up of twelve months is just the same thing as to say that the noctidiurnal revolution is made up of twenty-four hours. In either case it amounts only to this, that the year is made up of itself, the day is equal to itself. There is no natural motion, on which to found this subdivision of the day, distinct from that which

constitutes the day itself: nor any, on which to found the corresponding subdivision of the year, different from that which causes and measures and defines the year. If such subdivisions of both have existed among mankind from the first, they must have been positive, and by appointment either of the Creator, for the use of his rational creatures, and so understood by them from the first, (which, in our opinion, is the true explanation of the fact;) or of men for themselves, in the exercise of their own discretion, and of their own judgment about what might be fitting, or what might be necessary, even from the first. But the only true measure of monthly time, the only one of that kind which had a real foundation in nature from the first, as much as that of noctidiurnal and of annual, was by the course of the moon; and if mankind had this measure, as well as the other two, from the first, it must have entered the calendar also along with them from the first; and the calendar reckoning of time as comprehending all the measures of nature, which were essentially distinct and yet were actually united from the first, must have been lunar, as much as solar, from the first.

SECTION IV.—*The cycle of day and night the primary or elemental principle of both classes of measures, both the natural and the civil; and why.*

And this brings us back to the point from which we have digressed. The primary moving cause, the ultimate foundation of the substitution of one of the civil for one of the corresponding natural measures of time, which appears to have held good every where among mankind from the beginning of things, was *this* fact: that all the three natural measures, having already been inseparably united before mankind came into being, were found to be so united, and to be proceeding in conjunction, when men themselves came into being. Such was *de facto* the state of the case: and such being the state of the case, men could have no alternative except to fall in with it, and to accommodate themselves and their own institutions to it. It must have been so, on their part, even had this state of things not been the best and wisest which could have been provided for them. How

much more so, when it was both the wisest and the best! when it was every thing which they could have desired, and, had their ability been equal to their desires, which they could have contrived for themselves!

Three individual measures of this kind however having thus been inseparably connected, yet three measures *communis generis*, (differing, one in comparison of another, only as more of the same thing from less,) it was a necessary consequence of this fact too, that one must run into another, the less into the greater, perpetually; that, ascending up from the least, they must terminate in the greatest; or coming down from the greatest they must be resolved into the least: that is, the day must be multiplied and enlarged into the month, and both into the year; the year must be a complex and multiple of months, and both the year and the month must be a complex of days, to a certain extent at least. It follows that the primary element of time after all, the element out of which each of the larger measures was to be obtained by composition, and into which each was to be resolved by decomposition perpetually, must be the day; while the day itself was neither resolvable into any thing, nor measurable by any thing, of the same kind distinct from itself. Not only the ultimate constituent part of each of the two larger measures, but the primary element, and consequently the absolute atom, the monad, or unit, of time itself must be the cycle of day and night.

Now with the cycle of day and night in particular, no one will venture to deny, that both man and the whole of the system of things of which he makes a part, had a close and a necessary connection from the first; not merely as with the ultimate principle and element of time, and through his own connection with time in general, but for other reasons. The constitution of human nature, and that of the animal, the vegetable, and even of the material world; the common necessities of all; not only their well-being but their very being and existence; in particular, the wants of man and of animals; the free use of all his faculties, whether of body or of soul, whether the gift of nature, or acquired or improved for himself; the intercourse of private and of public life; the circle and complex of duty and of occupation of every kind; the very maintenance and continuity of human so-

ciety; all are ultimately dependent on the cycle of day and night, because all are directly dependent on the alternation of light and darkness, of waking and sleeping, of active exertion and rest from exertion; and would still be so even if, according to the original appointment of nature, the cycle of day and night as a measure of time had been one thing, and, as the means of this alternation and reciprocation of changes and vicissitudes so indispensable to the necessities of human nature and of social existence, had been another.

The appointment of nature itself however, (and by nature let no one suppose that we mean any thing but the wise and beneficent Author of nature,) had already provided from the first that the cycle of day and night, which would be wanted to serve such necessary uses and purposes as these for the general benefit of man in other respects, should serve also as a measure of time; and what is more as the primary and most elementary measure of all. And this being the state of the case, it must be obvious to our own reason that, if a cycle like this, so necessary for ulterior purposes of a different kind, was also to stand for a measure of duration, and for the elementary measure too, it must be something perpetually finite and entire in itself. There could be no such thing in nature as an incomplete or imperfect cycle of day and night. All must be entire, and all must be one in themselves. And for this reason too, one must be the same as another; one must be equal to another. And as a necessary consequence of such sameness and such equality also, to whatsoever else they might be applied in common, they must be applied alike; they must measure and determine whatsoever they were used to measure and determine, alike: and what is more, they must reduce every thing else, to which they were applicable, to their own standard; they must make all other distinctions and measures of the same kind commensurate with themselves; or they could not be applied to them at all.

On this principle must it have happened that the cycle of day and night, having once been defined and laid down as a measure of time independent of any thing else, yet having been also inseparably connected from the first with ulterior uses and services, which gave mankind a more direct and immediate, a more sensible and practical interest in this

particular measure than in either of the other two; it was necessarily to be transferred to the other two, with which also men found themselves connected as well as with this; and it must be erected into a standard of reference for both at once. It is easy to see that, under these circumstances, the measure of time by the month or by the year must be perpetually referred to the measure of time by the day; that the ultimate element of both would be considered to be the day and the night; that what would be noted, and counted, and reckoned in both even as part of both perpetually would be the cycle of day and night. And as nothing but integral cycles of day and night, from the nature of the case itself, were capable of entering into such an account at all; it is easy to see, (and this is the point which is most to be attended to,) that if the cycle of the month, or that of the year, was not naturally and *a priori* commensurable with integral cycles of day and night, it must be rendered so by means of some contrivance or other.

SECTION V.—*The substitution of the civil for the natural measures of each kind, a necessary consequence of the above principles.*

This conclusion brings us at once to the substitution of the civil for the natural measures of every kind, as coæval with the origin of human society itself. We cannot conceive either the existence of human society without measures of time, or the existence of measures of time, along with society, in any other form than that of civil: nor yet of the existence of civil measures except as founded upon the natural; nor yet of the existence of civil, even as founded on natural and grafted upon natural, and yet as not being ultimately reducible to the one simple element of the day and the night.

Now it is easy to see that, excepting the cycle of day and night itself, there is nothing in nature commensurable with it; nothing to which it can be referred, but itself. And yet of the cycle of day and night only did the fact hold good from the first, as it does still, that, simply as defined and constituted by nature, and as something *sui generis* and standing alone, and independent of every thing else of like

kind, it was equally well qualified to be the perpetual standard of reference for civil time: and it is one of the many proofs of the Divine wisdom and goodness which chronology brings to light, (whether men have duly reflected upon them or not,) that to the truth of this first, this simplest, and most elementary of the natural measures of time, yet the most indispensable every where to the wants and necessities of physical, moral, and social existence, it makes no difference according to what rule it may be reckoned perpetually. The noctidiurnal rule may be positive every where: but if it is the rule of the reckoning of day as day and of night as night continually, and if it be only uniform and consistent with itself; it cannot be one thing in the civil sense, and another in the natural sense, of the rule; or so little different in the one from what it is in the other, that it may be considered as absolutely and perpetually the same in both.

The case is different with each of the other two measures. The natural month and the natural year can never be commensurable with the civil month and the civil year; because they can never be commensurable with the natural cycle of day and night, nor (as the same with the natural) with the civil. No number of integral cycles of day and night will measure the natural month or the natural year; and therefore no number of civil: yet integral natural cycles of day and night must enter the natural month and natural year; and therefore integral civil cycles also. It is essential however to the civil cycle of day and night, though it is not so to the natural, that whatsoever it enters as an elementary or component part, it should enter it in its totality and in its integrity. We cannot conceive the same civil cycle of day and night divided between two months or two years; as we may the same natural one. Hence the substitution of the civil or calendar month, and of the civil or calendar year, for the natural; because both the former are and must be measurable by integral cycles of day and night perpetually, as neither of the other can be. But hence too the necessity of a system of adjustments and compensations between calendar menstrual and annual, and natural menstrual and annual, time respectively, which is not wanted for calendar nocti-

diurnal and natural noctidiurnal time. The civil standard in this latter case is always commensurable with the natural. In each of the former, sometimes too much sometimes too little is given to the civil standard, in comparison of the natural, with a view to keep the latter always commensurable with the civil or natural cycle of day and night also. And this must be redressed at stated times, by setting off excess against defect; i. e. by giving the calendar measures of those of nature, in these two instances, as much less at one time, in comparison of the standard of nature, as more at another; and *vice versa.*

SECTION VI.—*On the true point of view in which the civil measures of the month and of the year are to be regarded in opposition to the natural; viz. as cycles of day and night.*

It is in accordance with the above conclusions as to the matter of fact, that the civil month and the civil year in particular have never consisted any where except of integral cycles of day and night; but it follows also from this fact that the civil month and the civil year themselves, in contradistinction to the natural, cannot be any where, or under any form and any denomination, any thing but certain sums and collections of integral cycles of day and of night.

Chronologers have never sufficiently attended to this distinction. But the truth of the distinction, once pointed out, is self-evident; and it is a circumstance of peculiarity which, if true, must effectually discriminate the civil month and the civil year from the natural; though the name of the month or of the year is every where applied to both alike, and one is currently supposed to mean the same thing as the other. For the natural month and the natural year never did, nor ever could, (except hypothetically,) consist of a given number of integral days and nights at all; much less of the same number perpetually.

The fact to which we have thus adverted is especially true of the civil lunar month, which has always been reckoned in entire cycles of 29 days and of 30 alternately, or *vice versa;* or at least in some number of such cycles, alternating with and succeeding some other in a stated and regular order: for

there have been civil lunar months of 31 or of 32 days, and of 26 or of 20 or of 15 days, respectively.

With regard to the lunar year; in strictness and as a different thing from the lunar month it has no actual existence: but that complex or sum of lunar months, one after another, to which men have agreed to give the name of the lunar year, whether restricted to twelve, or enlarged at stated times to thirteen, has never consisted of less than 354 or 355 integral days and nights, or of more than 383, or 384, or 385, as the case might be.

The same fact is eminently true of the original form of the civil solar year, the primitive civil year itself: which, as we shall see hereafter, never was any thing but a cycle of days and nights, of uniform and invariable amount. It is equally true, in reality, whether it is, at first sight, equally apparent or not, of that form of the civil and solar year which has every where, or nearly every where, supplanted this primitive one; viz. the Julian or the Gregorian year. The mean Julian year, as it is called, of 365 days 6 hours of mean solar time perpetually, has no actual existence; and, (as we may add,) except in the tables and calculations of the astronomer, no actual use and application. As an actual measure of annual time, the Julian year neither is at present, nor ever has been, any thing but a cycle of 365 days at one time, alternating, after a certain order, with one of 366 at another.

It follows too, from these premises, that, if the civil month, or the civil year, is merely a larger cycle of integral days and nights, it cannot be any thing different *in genere* from the hebdomadal cycle, or cycle of the week; which is a cycle of the same kind also, only of smaller dimensions. The same primary element enters into all these cycles, and in the same form alike. It follows also that each of these greater cycles of the same kind must have a preaptitude and predisposition, derived from their composition and constitution itself, to be amalgamated with the lesser; and that both the civil month and the civil year, having once assumed a certain relation to the hebdomadal, must be capable of retaining it perpetually, or of returning to it, at stated times, ever after; and having once been equated to, and measured by, the hebdo-

madal, under certain circumstances, must admit of being reduced to it and measured by it, under the same circumstances, perpetually.

The case must be very different with the natural month, and the natural year; and with the relation of either of these to the hebdomadal cycle. Both these are fixed and invariable things in themselves; but not so in terms of the cycle of day and night. They cannot be constantly compared, or constantly equated, to any fixed number of days and nights. The return of the days of the week to the same order in the noctidiurnal succession of the civil month or of the civil year, at stated intervals of time, and at very short intervals too, must be obviously and *a priori* possible; but the return of the order of feriæ to the same relations as before in the noctidiurnal succession in the natural month or in the natural year, except in proportionally longer and larger periods of time, will not be possible.

These distinctions are founded in the nature of things. It is very desirable that the reader should settle them in his mind beforehand: for much depends, (as we hope it will appear hereafter,) on having clear ideas and correct apprehensions concerning them.

SECTION VII.—*Application of the above conclusions to the positive standards of the Fasti Catholici.*

We have thus endeavoured to explain what appears to us to be the true theory of the substitution of the civil for the natural measures of time, at all periods of human existence, and in all quarters of the world. We have resolved it into the natural and necessary consequence of *three* matters of fact; each of which held good from the first, if not before the origin of mankind themselves: i. That one and all of the measures of time were already in existence, and going on in conjunction, before men themselves had been brought into being: ii. That from the moment of their own existence, and by virtue of the law of their being itself, men found themselves more closely connected with one of these measures, the cycle of day and night, than with either of the other two: iii. That, through the wise and prospective contrivance of the Benevolent Author of the whole system of which both

time and mankind were destined to form a part, this most indispensable of all provisions for the physical and social wants of his rational and moral creation was so constituted as to be the first and simplest and most elementary of the measures of time also; a measure which must enter perpetually into every other, yet would least of all require any modification of its own, to adapt it to the circumstances of human existence, or to any of the positive rules of society: a measure which might be adopted and embodied in any conventional mode of reckoning it, and yet would be equally true to nature in each.

We shall now proceed to apply these conclusions to our proper purpose; which is the substitution of some kind of artificial, conventional, and positive equivalent for those natural standards and measures of time, which we have agreed to recognise in our Fasti: yet so as to descend into particulars at present no further than may be necessary in order to elucidate principles, and to explain the general arrangements on which we propose to fix.

CHAPTER II.

SECTION I.—*On the Civil Cycle of day and night, and on the various modes of reckoning it; and on the mode of reckoning it adopted in the Fasti.*

With regard to the first as well as the simplest of the measures of time, it has been already observed that it was always so constituted even by the appointment of nature, and already from the first so adjusted for any use which men might require to make of it, that no civil method of reckoning it could be fixed upon, which it would not be found to suit; no civil representative could be substituted for the standard of nature in this instance which would not represent it correctly.

The truth of this observation will appear upon reflection. The natural cycle of day and night is the revolution of the earth about its own axis. A complete cycle of the former

kind is a complete revolution of the latter kind, and something more; that is, it is the return of the same meridian on the surface of the earth not only to the same point of space, (the locus of one of the fixed stars,) but to the same sun, either the actual or the mean sun, perpetually. This return to the actual sun is the actual cycle of day and night; and this return to the mean sun is the mean. But they are both alike the cycle of day and night, as the same with the cycle of light and darkness, perpetually.

It has been shewn that these two cycles differ so little from each other at a given time, that they may be considered as always the same; and that there are stated times in every year, at which they are actually the same. It has been shewn too that, notwithstanding this difference between them, slight as it is, that which is to be regarded and treated as the positive appointment of nature for this particular purpose of defining the cycle of day and night, i. e. the cycle of light and darkness, by the returns of the same meridian to the same sun perpetually, is the mean cycle and not the actual of which we are speaking; the cycle determined by the return of the same terrestrial meridian to the mean sun, and measured by the period of 24 hours of mean solar time perpetually.

It makes little difference therefore, from what determinate point in the same revolution of the earth about its axis, by which a given meridian is thus perpetually brought to the mean or to the actual sun, the cycle of these returns to one or the other is supposed to be reckoned; nor by what name that epoch is called, whether morning or evening or noon or midnight. The cycle itself is the same in each of these cases. It makes no difference too, whether the interval of these returns is reckoned in a constant succession of periods of 24 hours of mean time, or of one of 24 hours of variable time; nor whether these hours are reckoned continuously from one to twenty-four, or divided into two halves of twelve hours each; nor whether the whole of one of these periods is supposed to constitute one cycle, which in Greek would be called a *νυχθήμερον*, in Hebrew an Arebbekour or evening-morning, and in English a night-day; or one half of the whole the day, and the other half the night. All these

distinctions have existed, and do still exist: but they are all accidental, and all indifferent. They are matters of detail, and matters of convenience; with respect to which all communities and all ages have had and still have an equal right to judge for themselves, and to decide upon their own rule.

It was a very common practice in former times, (almost universally so,) to keep the account of the cycle of day and night in 24 hours of variable time, that is, of time which varied according to the seasons of the natural year, and therefore might be called *kairic* in opposition to mean; and it is still the rule to do so in certain parts of the world. In this mode of reckoning the cycle, the reference is to the actual sun perpetually. It admits of a question however, whether the reckoning of day and night by mean time was not both known and in use from the first; or at least from a much earlier date than learned men and chronologers have hitherto been inclined to believe. And however generally kairic or variable time might be used for this purpose at first, yet it would soon be perceived from experience and observation of the fact, that there were two seasons of the year, the vernal and the autumnal equinoxes respectively, at which even kairic or variable time assumed the form of invariable, and the hours of day exhibited no symptoms of inequality to the hours of night. The observation of this phenomenon, along with the experience of its regularity, would be the discovery of mean in opposition to variable or apparent time; for no one requires to be told that even mean noctidiurnal time is nothing more or less at all times than kairic time twice in the year; and that, when the ancients would speak of mean time in contradistinction to variable, they call it equinoctial time.

The only question then, which concerns the proper method of the civil reckoning of the noctidiurnal cycle from the first, is one of *fact;* whether there was such a thing as an universal and common mode of reckoning it even from the first: and if there was, what it was. Nor would it be proper to decide such a question on abstract or *a priori* considerations of any kind, but solely according to testimony, and to the usual rules and principles by which we judge of other matters of fact.

This is an important and interesting inquiry, as well as a preliminary one; and we hope to enter upon it at the proper time hereafter, though we are obliged to postpone it at present. Supposing however this question determined, and in the affirmative, that there was a primitive rule of reckoning the noctidiurnal cycle, and one which was every where in force at first, and in many parts of the world is still in force at this very day; the next thing for our consideration would be, whether this was the rule which we should be bound to adopt in our tables to the exclusion of any other; or whether, though we adopted this primitive rule, yet, from the special reasons of the case, we should not be obliged to incorporate some other along with it.

The actual rule of the noctidiurnal reckoning at present is the Julian; and that is to reckon the day and the night from midnight. The primitive rule was to reckon it from sunset. There is no incompatibility between these rules, provided both are not supposed to have come into existence at once, nor both to have been in actual use at once: but only one after the other. And this too is a point which requires to be carefully ascertained and settled beforehand; though we cannot enter on its consideration at present. Suffice it to say, that in our own tables both the primitive rule and the Julian will be found to be combined from the first; yet both at first, and ever after, to proceed in unison and in harmony one with the other.

CHAPTER III.

On the Civil Cycle of Lunar time, and the various modes of representing it.

SECTION I.—*On the principle of compensation common to all these modes.*

IF the natural standard of that revolution, which is called the lunar synodic month, were limited to 29 days 12 hours of mean solar time exactly, it would be easy to accommodate the civil standard of this revolution to the natural one, by

reckoning it 29 days long at one time, and 30 days at another, or *vice versa;* by virtue of which compensation of defect by excess, or *vice versa,* alternately, the standard of human expediency and that of nature could never differ from each other by more than half a day at once, nor for more than 59 days in sequence. And in fact a compensation like this has been every where contrived and adopted; and in order to adjust the civil reckoning of lunar time to the course and succession of natural, in the first instance at least, whether they were expected to agree together perpetually or not, such a compensation as this must have been contrived and adopted.

And if the natural standard of lunar time consisted of 29 days, 12 hours, 44 minutes of mean solar time exactly, the same contrivance would be found to answer the same purpose of equating the civil reckoning of lunar time to the course and succession of natural, if not in so short a time, yet just as completely at last. Nothing would be necessary except to wait until these 44 minutes of mean solar time, over and above 29 days 12 hours, had accumulated to a day and a night, or to the greatest part of a day and a night; and then to take them at once into the account of the calendar reckoning of lunar in terms of noctidiurnal time. And this periodic equation of calendar lunar time to natural, effected by such a system of compensations according to some proper rule contrived and digested for the purpose, would constitute the proper cycle of the calendar reckoning of true noctidiurnal and true lunar time both together perpetually; and such a cycle once digested and laid down would be of constant use and applicability. And there is actually a calendar reckoning of both kinds of time, constructed on this very principle, which is still in existence; the well-known calendar of Hej'ra, the civil calendar of Mahommedanism every where: the lunar standard of which is precisely that which we have just supposed; and therefore its proper cycle, and its other peculiarities, have always been conformable to it.

But the actual natural standard even of mean lunar time contains something more than 29 days 12 hours 44 minutes of mean solar time perpetually; which, according to our own

assumptions, amounts to 2 seconds and 33 or 34 thirds of mean solar time at least: and this is as much a necessary constituent part of every actual or every mean natural lunation as the 29 days 12 hours 44 minutes which enter it also. And though such a fraction of natural lunar time may seem to be too insignificant to require to be taken into account in a particular instance, yet if it is neglected and omitted perpetually it will amount to something considerable at last. More especially will this be the case where the entire course of lunar time from the first is professed to be traced and exhibited, and yet any the least integral part of such time, which actually belongs to it and actually enters it, is systematically neglected. In 6080 years of lunar time, for example, such as we exhibit in our own tables, there could not be fewer than 72,500 mean or actual lunar revolutions. The constant omission of 2 seconds 33 thirds of mean solar time, in the reckoning of each of these, would make a difference of two days and nights, and nearly of four hours more, of mean solar time; by which the last revolution of the number would fall short of the truth. Nothing therefore is to be treated as slight or insignificant in such cases as these. But if every thing is to be taken into account in its proper place and order of time, proportionally longer and more intricate systems of compensation, (that is, cycles or periods of the restitution of calendar time to natural of the same denomination,) will be necessary.

SECTION II.—*On the natural lunar cycle of the primitive solar year; that is, the Apis cycle of antiquity.*

Now though there is no such thing in strictness of speech as the lunar year, except in the sense of the lunar month; yet, forasmuch as the lesser measures of time necessarily run into the larger, (the month into the year, and the day and night into both,) the connection of lunar with solar time may be considered to have been an appointment of nature itself from the first. Nor has human authority ever been found to run counter to the constitutions of nature in this respect; nor in fact ever could have done so: for to keep an account of the succession of lunar months, as if entirely distinct from

and independent of the parallel succession of solar, even had men been inclined to try the experiment, must soon have been found to be impracticable.

The lunar reckoning of time therefore even in the calendar has always been associated with the solar. The civil reckoning of lunar time has never been found to proceed independently of some form or other of the civil reckoning of solar. And since a certain succession of smaller divisions of the year, called months, was necessarily included in the latter; a similar succession under the name of months was included in the former also. And thus, by degrees, the idea of the lunar year arose out of that of the solar; and a certain number of lunar revolutions, one after another, being found to correspond more or less for the time being to the just measure and just revolution of one solar year as made up of twelve solar months, this number of lunar revolutions came to be regarded as the lunar year; and as not less entitled to the name of the year in the constant reckoning of lunar time, than twelve solar months in the constant reckoning of solar.

This being the case, it is impossible to answer the question, what might be, or what must have been, the proper method of reckoning calendar lunar time from the first, without first answering another; what might be, or what must have been, the proper method of reckoning calendar solar time from the first also? And to this question in point of fact no answer can be returned but one; viz. that calendar solar time was reckoned at first according to one rule. The primitive solar and civil calendar was every where one and the same equable cycle of 365 solar days and nights.

Now it appears to have been a constitution of nature, that this simple and uniform annual reckoning of solar time should have an equally simple and uniform reckoning of lunar inseparably associated with it; that both in conjunction should form a combination of solar and lunar time springing out of the essence of each, and inherent in the relation of one to the other; a solar cycle of this primitive description, and an equally primitive lunar cycle, its natural accompaniment: and this lunar cycle none other but that which we

have already mentioned, and to a certain extent have described, under the name of the Apis cycle[e].

This lunar cycle is so critically adapted to the annual solar cycle of 365 days in question, that we can scarcely imagine it ever existed apart from it; not simply in itself, (which was absolutely impossible,) but in effect and practice: that is, that men could ever have been in possession of this particular form of the solar year, and not also have had this kind of lunar year along with it. And yet we freely admit that the first actual proof of its existence, even in connection with the primitive solar calendar, meets us at a comparatively late point of time; and not with the first commencement of human history, or of the history of time itself. Let it be considered however how little we actually know, from any quarter but Scripture, of the beginning of human history, or of the beginning of time; and there will not appear to be much weight in this objection. It can never overbalance the great antecedent probability, if not the absolute certainty, that neither of two things, so inseparably connected in themselves as the primitive solar and the primitive lunar year, could ever have been used from the first except in conjunction with the other. But this too is one of those questions which may properly stand over for the present. In due time we hope to produce proofs that among the Egyptians at least this primitive lunar year was actually in use from the first along with the primitive solar.

It is peculiar to this primitive lunar cycle to proceed in periods of 25 primitive solar years; and at the end of that number of solar years, to bring back the same nominal lunar and solar dates to the same state of relation to each other as at first. Its adaptation to the true reckoning of mean lunar time in terms of calendar or civil at first was such that it required a correction only once in 600 equable years; as we hope to demonstrate hereafter.

By virtue consequently of the connection thus established between a solar year like the primitive, and a lunar one of this primitive description also, a true and perpetual reckoning of lunar time is necessarily incorporated with a true and perpetual reckoning of solar, in the form of the primitive

e Diss. ii. ch. ii. sect. iii. p. 66.

solar year, whether it is expressly so represented or not: and as we exhibit the latter in our tables, from beginning to end, *in annis expansis*, we virtually exhibit the former also. Primitive lunar time, in these tables of ours, must necessarily accompany primitive solar: and in whatsoever state of relation to each other they set out at first, to the same they must return, (nominally at least,) after the lapse of one of those intervals, measured in primitive solar years, which constitute the period of the Apis cycle.

We have not considered it necessary to give the succession of these cycles in detail: which would have tended to complicate our tables too much. If the reader is aware that the length of each is 25 years of its proper æra, and that that is the *æra cyclica* which he will find noted in our Fasti from first to last[f]; he can have no difficulty in tracing the succession of such cycles perpetually. Every secular and every millenary year[g] of the æra cyclica is necessarily the epoch of an Apis cycle, reckoned continually from the beginning downwards: and in every 100 years of this æra there must be four such cycles; and in every 1000, forty.

It would be premature too to enter on the details of this primitive lunar reckoning at present; or to shew in what manner it was actually brought down, among the Egyptians in particular, from the first; and what changes it underwent either among them, or elsewhere, at last. The proper opportunity for such explanations will be when the history of this primitive cycle itself comes under our consideration, first in connection with the Egyptian calendar, and then with the Babylonian, and afterwards with the Chinese, and lastly with the Armenian. For it is a singularly interesting fact, (though hitherto not so much as suspected by modern chronologers,) that this primitive reckoning of lunar time, so venerable for its antiquity, this lunar cycle coæval with the origin of human society, in the fourth century of the Christian æra was consecrated by the Armenian church to the service of the Christian Easter, and of the other festivals of the Christian religion; and continued to be so dedicated and so applied for 200 years at least.

f See the Introduction to the Tables.

g In strictness every 101st and every 1001st in the æra.

SECTION III.—*On the civil cycle of annual lunar time as connected with the Julian cycle of annual solar time.*

One form then of the civil reckoning of annual lunar time, along with that of annual solar, is incorporated in our tables in and through the solar itself; and had this particular form of the reckoning of annual solar time continued to be still what it was at first, viz. the only reckoning of solar time which was to be met with any where; then no form of the civil reckoning of lunar time, but that which nature had thus associated with solar, could have been admissible into our tables perpetually, along with that of solar. And where there was no room for choice, there could be none for deliberation. We should have no alternative except to adopt the Apis cycle; and as long as we continued to represent the primitive solar reckoning of annual time, so long we must have continued to exhibit the primitive reckoning of annual lunar also.

But the system of time in all its parts, which is about to be proposed in our tables, to deserve the name of Fasti Catholici which it assumes, and to accomplish the object which it professes to have in view, must be adapted to every state of the case which has only been matter of fact, or is so at present; and even to the most different states of the case, if each in its turn has been equally matter of fact. Traced backwards or forwards, as it may be, the true scheme and succession of time must always be consistent with itself; for time at least always has been so: time itself has never gone on except in one way, and that the way of nature's appointing. Human systems and schemes of time, even though founded alike at bottom on this of nature, may have differed more or less from each other; but this one system and scheme of natural time never can have differed from itself.

If then it is matter of fact that one mode of the civil reckoning of annual solar time was in use at first, and equally so that another is in use at present; we have no alternative except to accommodate the actual course of time, as delineated in our tables, to both these matters of fact. It may be assumed that the actual civil year every where at first was the equable;

and it may be assumed that the actual civil year every where at present is the Julian or the Gregorian. Neither of these assumptions is incompatible with the other, unless both are supposed to hold good at once. Every one must allow it to be possible that one method of reckoning civil time might be every where in use at one time, and a different one, on an equally general scale, at another; though not different methods at the same time and every where too.

And this being the actual state of the case, we can neither anticipate the course of events by making the Julian reckoning the actual one *before* its time, nor contradict the course of things, or pretend to undo the effect of time, by continuing the primitive reckoning, as if it were still the only actual one, *after* its time. All that we can do with regard to that particular form of the reckoning of annual solar time, which we found every where in actual existence at the beginning of things, is to exhibit and represent it faithfully, as the only actual reckoning of the kind which was then in being; and if we think proper, even after it ceased to be in being, or to be the only reckoning of its kind which was yet in being, we may continue to represent it still, according to the same law and rule as at first: and all that we can do with respect to that other form of the same thing, which we find in existence every where at present, is to carry it back, if we please, from the present day to the beginning, according to its own rule and law; and to bring it down from the beginning to the present day, according to the same rule and law, just as if it had actually been in existence from the first.

The Julian year then being thus assumed, (either as *actually after* a certain time or as *hypothetically before* a certain time,) to have been the absolute standard and measure of annual solar time, (in either case always as one and the same thing in itself and as referred to any thing else with which it might require to be compared perpetually;) in this case too the proper corresponding standard and measure of annual lunar time, adapted to annual solar and destined to accompany it continually, will appear to have been prescribed by nature, as much as in that case which we have last described. The Julian reckoning of annual solar time has its natural concomitant reckoning of annual lunar time: and if we are

bound to bring down the succession of natural solar time in a constant scheme of annual Julian time, we are bound to bring down also the parallel succession of natural lunar time which has always accompanied natural solar, in some corresponding representation of Julian lunar time which must always have accompanied Julian solar time.

SECTION IV.—*On the first Julian type of lunar time, the octaëteris, or eight years' cycle.*

But with regard to this natural type of Julian lunar time in juxtaposition with Julian solar time; were there nothing *a priori* to lead to such a discovery, yet experience and the testimony of the fact would prove that the first and most obvious, if not the most natural, type of this kind is the octaëteris, or eight years' lunar cycle.

The ancients have asserted that other measures of lunar time, apparently simpler even than this, and prior in the order of succession even to this, such as the dieteris, (called also the trieteris,) and the tetraëteris, (called also the penteteris,) were used for the same purpose before it. The case may possibly have been as they affirm, in some part of the world or other. But they offer no proofs of their assertion. They appeal to no actual examples of the kind. We have met with none ourselves: and, as far as the matter of fact is concerned, we are altogether of opinion that such earlier and simpler lunar cycles, as the dieteris and the tetraëteris, never had an actual existence.

But with respect to the octaëteris; excepting the Apis cycle, (the civil lunar cycle of primitive antiquity,) and excepting the lunar calendar prescribed for the use of the Israelites either at the time of the delivery of the law, or at that of the final settlement of the tribes, and of the erection of the tabernacle at Shiloh; with these two exceptions, we say, the oldest lunar cycle discoverable among mankind, beyond all comparison, is the octaëteric, and next to that is the nundinal.

And as to the natural connection of this form of the reckoning of lunar time with that of the Julian of the reckoning of solar, or the possible perception by men of such a connection from the first; chronologers do not require

to be told that this is of all others that form of the reckoning of lunar time which assimilates itself most constantly and most completely to the Julian form of the reckoning of solar; so much so that were the Julian perpetually true to the sun, and the octaëteric perpetually true to the moon, nothing could be more strictly and more properly adapted to go on in conjunction than the octaëteric lunar cycle and the Julian solar cycle. And account for the coincidence as we may, the fact of the coincidence will still be the same; (and a very striking and interesting fact too;) that no sooner does the history of the civil reckoning of solar time bring to light the fact of the knowledge of the Julian principle of a reckoning of that kind, in the shape of calendars derived indeed from the equable but modelled on a principle analogous to that of the Julian; (and even of calendars similarly derived and absolutely Julian;) than in a very few years after this discovery, the history of the civil reckoning of lunar time also brings to light the existence of the octaëteris: as we shall see hereafter in more instances of the kind than one, if this work is permitted to attain to its completion, and to accomplish every thing which it proposes.

The peculiar constitution of the octaëteris however, which rendered it so much the better adapted to accompany the Julian reckoning of solar time, disqualified it only so much the more for serving as a constant and unerring standard of lunar time. And whatsoever might have been thought of it, or whatsoever might have been expected from it, at first, its good and its bad qualities would soon be put to the test of experience; and its inherent incapacity to serve as a perpetual measure of true lunar time would be detected by the testimony of a very few years. The consequence could not fail to be that it must cease to be trusted as such a standard of lunar time; though it might still be retained in use as a convenient measure of duration, and even as a constant standard of lunar time in the sense of calendar or nominal merely. And this appears to have been actually the case: that the octaëteris, having once been introduced into use, was never actually laid aside, not even when it had lost all credit as an actual measure of natural lunar time. And the knowledge of both these things is necessary, to explain and

account for what would otherwise be inexplicable; the appearance of the octaëteris, as an actual lunar cycle already in being, once before at a much earlier point of time: its reappearance in the same capacity of a lunar cycle, as something new and for the first time, at a much later period: and yet its continued existence, as a measure of duration, at intermediate points of time.

SECTION V.—*On the second Julian type of lunar time, the hekkaidekaëteris, or* 16 *years' cycle.*

The discovery however of the inherent defectiveness of the octaëteris, as the first step towards its correction, was not lost upon the ancients: and though it might not appear all at once, yet it must have been perceived in the course of time, (and with certainty too,) that if one cycle of this kind was already in error in comparison of the moon, two were more so; and so on: until at last it came to be distinctly apprehended, and thoroughly well understood almost every where, that the octaëteris was liable to lose a day and an half on the moon perpetually; and therefore *three* days every two cycles: which is, as nearly as possible, the exact representation of the actual state of the case.

This discovery was certainly made, among the Greeks in particular, between the time of the first introduction of the octaëteris into use among them, and that of its revival or its reintroduction in a new and amended form in the time of Solon; of both which things more, we hope, will have to be said in the proper place hereafter. It might therefore be expected that the next form of the lunar cycle, which we were likely to meet with, would be some modification of the octaëteris: and this cycle, by being merely doubled, gives birth to another, (a well known lunar cycle too,) called the hekkaidekaëteris, or 16 years' lunar cycle.

The hekkaidekaëteris is one of the lunar cycles of which Geminus gives an account in the natural order of his subject[h]; that is, next to the octaëteris and before the ennea-

[h] Geminus, vi. Uranologium 34 E—36 E.
36 E—37 C.
37 C—38 C.

kaidekaëteris. Yet of the actual use and application of this cycle, at a remote point of time, no proof is to be met with, as there is of that of both the other two: and in point of fact we are altogether of opinion that, as an actual cycle next in order and next in antiquity to the octaëteris, it never had an existence. And the reason of this too was most probably the fact that this cycle is only the octaëteric in another form and under another name; and that in all essential respects one is just the same thing as the other. The good or bad qualities of the octaëteris are the good or bad qualities of the hekkaidekaëteris also: or rather, while the good qualities of the simple cycle are no ways improved by its being transformed into the double one, its bad qualities appear to be doubled at once thereby, and made even worse or more glaring than before. As the octaëteris therefore was already in being, it was not likely that the hekkaidekaëteris would be substituted for it, merely to answer the same purpose.

In reality however the use which was made of both these cycles in conjunction was to arrive at the conclusion that as the true lunar reckoning was liable to gain three days, in comparison of the civil, in two cycles of the octaëteris, or in one of the hekkaidekaëteris; in twenty cycles of the former and in ten of the latter it must be liable to gain thirty days, that is, a whole calendar lunar month: and allowance being made for this anticipation, it was thus perceived that at the end of 160 years the civil or calendar lunar reckoning would be returning to the same state of relation to the true, and to the same state of coincidence with it, as at first. This was the discovery of the natural period of the octaëteris, as one of the forms of the lunar reckoning of time in constant conjunction with the Julian form of the reckoning of solar; the period in the course of which, and within the compass of which, the inherent defectiveness of the cycle as a true measure of lunar time is found to rectify itself, while it continues just the same measure of true solar time as ever. And, (whether chronologers have yet been aware of the fact or not,) we do not hesitate to affirm that this discovery was certainly made among the Greeks in particular, before the

time of Solon; as the Greek lunar calendar itself, from the time of Solon downwards, is competent to prove by its testimony.

SECTION VI.—*On the second Lunar Type of the Fasti, or the hekkaidekaëteric cycle of the Fasti.*

Our object at present not being to give an account of the modifications and changes of the civil calendar either among the Greeks, or elsewhere, but simply to explain the arrangements of our own tables; we proceed to observe on this subject further merely that, allowance being made for the inevitable tendency of the lunar dates in this form of the Julian reckoning of lunar time to rise on the solar three days in every cycle, the hekkaidekaëteris, simply as a measure of lunar time, is one of the most exact and the closest to nature which could be devised. It might have been intended by nature as the perpetual representative of the *mean* lunar month in terms of the calendar month. There may be forms of the same kind of reckoning better adapted to the *true* lunar month in terms of the calendar; but none is so constantly true to the mean as this. Allowance too being made for that one peculiarity of the lunar dates in this form of the civil lunar reckoning, viz. of not continuing attached to the same civil or calendar terms at the same periods of the cycle perpetually; it is as competent to accompany a constant solar reckoning according to a Julian rule, as the octaëteris itself. And as it is commensurable with the period of 304 years, into which it enters nineteen times exactly, it is equally well adapted for the reckoning of both civil lunar and civil solar time in the sense of Julian, as supposed to be comprehended in that period, and to be rectified, and readjusted to true lunar and true solar time, in the course of one such period perpetually.

For these reasons, it has appeared to us that the hekkaidekaëteris was one of the fittest on which we could fix as the type of a perpetual reckoning of natural lunar time according to a conventional and positive rule, analogous to that of natural solar time according to the Julian, and in juxtaposition with the latter continually. It enters our tables therefore as the second of those two types of the lunar cycle

of the Fasti which are incorporated in the division appropriated to the measure of time by the month. It is one of the proper representatives of that natural measure by a cyclical, a civil, and a purely artificial rule, which we exhibit from first to last. As to the details of the cycle, or the manner of its working in conjunction with the other combined with it also; and as to the system of administration by which it is kept constantly true to the moon, while it accompanies the Julian reckoning of solar time perpetually: it is explained in the proper place[i], but it cannot conveniently be explained here.

SECTION VII.—*On the Metonic cycle, the enneakaidekaëteris, or* 19 *years' lunar cycle; and on the first Type of the lunar cycle of the Fasti.*

Besides the octaëteris however in its first and simple form, and besides the hekkaidekaëteris, which is the octaëteris in its secondary form, there is another type of the reckoning of lunar time which nature appears to have designated, as the accompaniment and counterpart of the Julian reckoning of solar, even more distinctly and more emphatically than any other; and this is the enneakaidekaëteris, the cycle of 19 years, the cycle which, after the name of its discoverer among the Greeks, chronologers have long been agreed to call the Metonic.

The cycle so called, as an abstract or possible mode of reckoning lunar time in constant connection with solar in the sense of Julian, is founded in the nature of things, and is as old as lunar and solar time themselves. And if the Julian rule of the reckoning of the latter was possible from the first, the corresponding rule of the reckoning of the former from the first must have been possible too; and if the Julian rule had been an actual one of its kind from the first, this lunar rule must have been an actual one of its kind from the first also. And though in reality the Julian rule was nowhere, so far as we know, the actual rule of solar time from the first, yet the 19 years' cycle, (which is so necessarily connected with it that it implies it in its very existence,) had an actual existence and an actual application in one form or

[i] Introduction to the Tables, part ii. chapter ii.

other long before the time of Meton; for instance, among the people of Israel, 1100 years before the time of Meton; the cycle prescribed for their use, and possibly under the direction of inspiration itself, having been of this kind: and again, among the Hindus, 500 years and upwards before the existence of Meton, and among the Japanese and the Chinese, 200 years before his time; for each of these had a cycle of this kind, not only known to them in theory, but applied to the regulation of their calendar, and of their civil time itself. Among the Greeks indeed Meton may have been and probably was the discoverer of the cycle; and possibly an original discoverer too. No mention at least is made in Greek history of any one to contest the discovery with him, except Euctemon of Athens or Phaeinus of Elis; both of them certainly his contemporaries, and each of them sometimes spoken of as the author of the cycle as well as he.

This lunar Metonic cycle is just as much adapted to accompany the Julian reckoning of solar time, as the Apis cycle of primitive antiquity to accompany the equable. The Metonic cycle brings about the same perfect return of lunar time in the sense of natural to solar in the sense of Julian, as the Apis cycle does of natural lunar time to equable solar. It is as certain that 235 natural lunations in sequence will come round to the same order of succession again, and to the same Julian terms, in the constant Julian reckoning of solar time, as 309 in that of equable; and that 235 natural lunar months in sequence will equal 19 Julian years almost as exactly as 309 natural lunar months 25 equable years.

The Metonic cycle therefore is the natural lunar cycle of the Julian solar calendar. It is the civil form of the natural lunar reckoning best adapted to bring back the same natural lunar dates to the same civil and positive solar dates, for the longest time, without the necessity of any correction. It is the civil reckoning of lunar time which is distinguished above all others by the property of *fixedness;* so as always, or for the longest time, to be attached to the same seasons of the year, and to the same days of the month, while it continues equally true both to the sun and to the moon. It is that form of the civil or calendar reckoning of natural lunar and natural solar time conjointly, in the sense of Julian, by means

of which, and of proper rules of administration, both may most effectually and for the longest time be kept in any state of relation to each other which may be prescribed. It is that too which is always adapted either to the conjunction or to the phasis; and consequently is never liable to deviate more than one day, or two at the utmost, from the truth; and then only *per accidens*, and for a limited time.

We could not hesitate therefore to incorporate this natural Julian reckoning of lunar time in our Fasti along with the similar one of solar, as things which were always intended to accompany each other, and were predisposed to unite for that purpose. It enters our tables consequently along with the type already described, in the form of type i. of the same lunar cycle in general; not indeed as the simple Metonic, or vulgar Metonic cycle of ancient Athens, nor yet as the Callippic correction of that cycle, (i. e. cleared of the error involved in the original Metonic one,) but in the form of the 19 years' lunar cycle, adapted perpetually to the solar or Julian period of 304 years; to which we have given the name of the Hipparchean, and from the analysis of which we have obtained the mean lunar standard of our Fasti itself.

In this period there are 16 cycles of 19 years and 19 cycles of 16 years; so that it is equally well adapted either to the Metonic or to the hekkaidekaëteric form of the reckoning of lunar time in conjunction with the Julian reckoning of solar. It is necessary however, for the constant equation of calendar lunar time to natural in every 16 cycles of the former and in every 19 of the latter, that the number of integral cycles of day and night, or periods of 24 hours of mean solar time, in the calendar lunar reckoning through the whole of one of these periods, should be one less than the number contained in the calendar reckoning of Julian or solar time in the same: but this is the utmost amount of the correction which the period requires, to accommodate it to the Metonic cycle of lunar time in the sense of natural perpetually. And as twenty of these periods enter our tables in all, (the last an incomplete one,) the amount of such corrections, successively administered to them, is nineteen days in all, and no more. The first lunar as well as solar date, which enters our tables,

is the Julian date of the first day of the first of these periods, April 29 at 18 hours from midnight; the last is the Julian date of the first day of the twentieth, April 10 at 18 hours from midnight; the former as true to the actual lunar date, under its proper *solar* in the sense of its *Julian* exponent, for the time being, as the latter; and *vice versa*[k].

With respect to the cycle of 16 years, its administration even in the same period of 304 years could not be the same perpetually as that of the cycle of 19 years; because, besides this period of 304 years common to it along with the other, it has the period of 160 years peculiar to itself: and it requires one correction at the end of the first 160 years, confined to itself, as well as another at the end of the 304 years common to both it and the other. All these distinctions however have been cleared up and explained elsewhere[l].

To sum up then what we have been saying on these points: There are two positive or civil types of the natural reckoning of lunar time, which are formally represented in our tables, and are drawn out *in annis expansis* from first to last, type i. and type ii.; each intended and each adapted to accompany the Julian reckoning of solar time perpetually. There is a *third* also virtually included in them, though not exhibited in detail, in the shape of the Apis cycle which necessarily accompanies the primitive civil reckoning of the solar year.

And were it inquired which of these different lunar types was the best qualified for its proper use and purpose, it would be difficult to answer that question; for a constant comparison of all three together, and of each with the truth, at a particular time, as it may happen to be known from testimony, or as it may be discoverable by calculation, will always prove that they are consistent with each other, within the limits prescribed by their respective laws and administration, and that one is as true to nature as another; so that one cannot be better adapted to its proper use and purpose, at a given time, than another.

But if the point to be decided were which of the three was the most competent to answer its proper end and purpose

[k] See the Introduction to the Tables, part ii. chapter ii. iii.

[l] Introduction to the Tables, part i. chapter ii. and iii.

for the longest time, without standing in need of correction, and which was consequently the most perfect in that respect; the palm of superior excellence, beyond all doubt, must be awarded to the Apis cycle; the lunar cycle of primitive antiquity, the cycle which nature itself provided for the primitive solar year. For whereas, in the course of the 6004 mean natural or mean or actual Julian years which enter our tables from first to last, 19 corrections of our Metonic type are seen to be necessary, each of them amounting to a day; in the 6008 primitive or equable solar years which enter them likewise, only 10 or 11 corrections of the Apis cycle would be wanted: that is, little more than half as many as are required for the other cycle; yet in the same length of time.

CHAPTER IV.

On the civil year, as substituted for the natural; and on the Types of the civil year, substituted for the natural in the Fasti.

SECTION I.—*On the consistency of the ultimate or resulting state of the civil measures of time with the primary or original ones.*

THE third and last of the questions, which we have to consider, is that of the substitution of the civil year for the natural in general; and that of the particular type or types of the former, which were most proper to be substituted for the latter in these Fasti. And though this is not the least important of the subjects which we have had to discuss; (on the contrary, more depends on this than on any other;) yet since much, which we have had to say with reference to former questions of the same kind, is more or less applicable to this; we must endeavour to be the more brief in what we say concerning it.

We have already observed that, as our present undertaking is not to delineate an imaginary scheme of time, which might possibly have been matter of fact, and possibly

[m] Dissertation iii. Chapter iii. sect. iii. p. 101.

might not, but one which both might and must have been matter of fact; the scheme which we do delineate and exhibit perpetually must not only begin with being real, but end with being so, and not only end with being real, but begin with being so. If we cannot succeed in this object, it is much better that we should not attempt any thing of the kind at all. We shall spend our time and our labour to no useful purpose. We shall produce nothing, after all, which will not be utterly worthless, however ingenious, because totally unreal, and therefore without foundation; and practically of no value whatsoever.

For that the undertaking itself is a possible one, that it proposes an object which is capable of being attained, none but an atheist or fatalist, none but a freethinker and sceptic, no one who was not imbued, beyond all hope of recovery to reason and common sense, with the worst and deepest prejudices of the soul-destroying philosophy of modern times; could venture to deny. It is not the problem of squaring the circle, or of finding out the philosopher's stone; or the discovery of the secret of perpetual motion; it is nothing extravagant, nothing impracticable, which our undertaking has in view. It has a secret indeed to discover, and a mystery hitherto concealed to bring to light: but the clue to the discovery is put into our hands; and if we will only follow where it leads, it will conduct us to the discovery of itself.

It is no mere hypothesis that time itself, in all and each of the measures whereby it stands connected with the present system of things, has had a beginning; and that too within the scope of history and of possible human research. It is no hypothesis that having begun in a certain way, within the compass of human experience, in constant connection with the established order and system of things, it has never ceased to go on in the same way, and it is still going on in the same way, as at first. But if so, it is a just and legitimate inference from such premises, That what has had a beginning in a certain way, not of indefinite antiquity, but as the Greeks would have said of it, (comparatively speaking,) *χθὲς καὶ πρώην*,—what has ever since gone on in the same way, and what is still going on in the same way, as at first; if we will only follow it upwards in the same steps

in which it has come downwards, must admit of being traced back even from the present day to the point where it first began.

If this however be the case, it follows that no representation of the actual course of time from first to last can possibly be true, which is not equally well adapted to every actual state of the case; and even, if necessary, at different times to the most different states of the case: which is not as competent to account at a given time for the present from the fact of the past, as to explain the past by the actual facts and phenomena of the present. Time is to all intents and purposes a stream, which began to flow at first as a derivative current from the great and unbounded ocean of duration without a beginning; and may be destined, for ought we know to the contrary, to lose itself at last, and to be again absorbed, in the immensity of duration without an end. But in the mean while it flows, and continues to flow, as a stream which partakes of the nature of duration, and proceeds parallel to it perpetually, yet always independent of it, and distinct from it; just as some rivers run through lakes in their way to the sea, without losing their waters, or mixing them with those through which they pass. And a river or stream, which is confined to one channel, which runs in one current, and which comes from one head, it must be possible to trace to its source, by following it along that channel, and up that current, until we come to the fountain-head.

The matter of fact with which we are concerned historically at first is *this:* That civil annual time was reckoned in *one* way and according to *one* rule: that with which we are concerned at last is *this:* That civil annual time is reckoned at present in *another* way and according to a *different* rule. With both these matters of fact we are bound all along to compare a *third* fact; That natural annual time, (annual time the appointment of nature, and not of man,) never was, nor ever could be, reckoned in *any* way, nor according to *any* rule, but *one.*

Does it follow then that annual civil time at first, and annual civil time at present, must one or both of them be different from natural annual time, because they are not the

same with each other? By no means; at least if it is manifestly possible that the standard of nature, in a case like this, might continue always the same with itself, while the standards of human expediency, by which it might be proposed to represent it perpetually, might be different at different times; yet each as allowable for its proper purpose, in its proper order of time, as another. It is a very conceivable case, that even seemingly different representations of the same natural prototype might be one and the same thing after all, differing only in circumstances and accidentals; and what is more one might even be derived from the other, and be substituted in its stead, in order to answer a common purpose, that of the continued representation of the same natural original and archetype at different times in a different way.

SECTION II.—*On the derivation of the secondary or ultimate type of the civil year, every where, from the primary and original one.*

And this brings us at once to the solution of the problem with which we are concerned; and to the explanation of the difficulty connected with the actual state of the case; viz. if the civil type of natural annual time was one thing at first, and universally so, and is a different thing at present, yet almost on as large and indiscriminate a scale; by what means has this state of the case been reversed, and the actual form of the civil reckoning of annual time come to be so generally different at last from what it was at first?

The answer to this question is supplied by a matter of fact, which would authorize the same answer to the same question in the case of every calendar distinct from the primitive, which has an actual existence at the present day; but we may consider it restricted to the single case of the Julian or of the Gregorian, as that one form of the civil reckoning of annual time which may be assumed to be every where in use at present, instead of the original and primitive one of all mankind. And the answer is neither more nor less than *this:* That even the actual civil type of natural annual time, which is generally in use at present, is derived from the primitive civil type of the same thing, which was universally in

use at first; and therefore that the existing difference between the state of the case in this respect at first, and the state of the case at last, is, after all, apparent and not real; is accidental at least in its origin, (humanly speaking,) and substantiates instead of impairing the unity of type in civil time all along, analogous to that of the antitype in natural; and the constant subordination of the former to the latter, in a manner consistent with itself from first to last.

For if we go back in search of the origin of the Gregorian form of the civil reckoning of natural annual time, we find it in the simple Julian, not more than 300 years distant from the present day. If we go further back to find the origin of the simple Julian, we discover it in the Roman correction of the dictator Cæsar, more than 300 years, it is true, beyond the date of the Gregorian, yet some thousands of years short of the beginning of time itself. If we go back to the origin of the Roman correction of Cæsar, we find that too in due course of time in the earlier correction of Numa Pompilius. But if we attempt to go still further back to the origin of the Pompilian correction, we find ourselves launched at once on the main stream of human time, and ascending the common channel and current of calendar time every where directly upwards to the fountain-head.

The Roman correction of Numa Pompilius in its proper order of time, (like every thing else of the same kind which the history of calendars brings to light,) is in immediate contact with the primitive calendar. The *very first day* of the *very first year* of the *very first cycle* of the calendar of Numa, and the *very first day* of the *very first month* of the *current year* of the equable primitive reckoning of annual time until then, were absolutely one and the same. And this primitive reckoning, traced upwards beyond this point of contact with one of the calendars derived from itself, on how many soever besides it may touch at intermediate points of time, cannot and will not stop short until it arrives at the common head and source of all; and that is the beginning both of civil and of natural time alike, the origin and epoch of the present system of things, of which both civil and natural time have always made and still do make only a constituent part.

The current of human time will ascend to its proper source; and therefore it will go back to this point, if followed far enough: but as water cannot rise higher than the level of the springs from which it flows, so neither can human or mundane time pass beyond the beginning of human existence or of the world itself. It does not follow from this fact that the actual beginning of human time is the absolute beginning of time itself; or that because human and mundane time has had only one beginning, and natural time in conjunction with human and mundane has had only one beginning too; yet antemundane time as distinct from mundane, and natural as different from and independent of human, can have had only that same beginning also. We are concerned with nothing but the origin of human time. We have nothing to do with natural time except as the same with human, and consequently in conjunction with human. And with respect to both at once, or as so united perpetually, there is no civil measure of annual time, in conjunction with natural and instead of natural, at this moment existing in all the world, and there never was any such heretofore, which, being traced up to its sources, and resolved into its first principles, is not found to lead to a common and simultaneous origin of civil and natural annual time both at once; and that the very beginning of the present system of things, which we call the world.

This may be a surprising announcement to many persons. It will probably be new and unexpected to all; and we should not think it extraordinary if it is even unwelcome and unacceptable to some; i. e. to the pseudo-philosophers, the pseudo-rationalists, and the pseudo-chronologers of our own day. But if it rests upon facts which cannot be disputed, if it is substantiated by testimony, of which we do not affirm too much when we say that, if there be such a thing as infallible testimony, *that* testimony must be infallible; whatsoever reluctance there may be to receive such an announcement, and whatsoever prejudices it may have to encounter in the false philosophy, the false rationalism, the false criticism, and the false chronology, which are so much in vogue at present; they must give way before it; and men must be

content to acquiesce in this conclusion, whether they will or not.

SECTION III.—*On the primitive type of the civil year, incorporated in the Fasti Catholici.*

The primitive type then of civil annual time having been universally of one kind, it could not admit of a question that, in a system like that of our Fasti, which professed to be a matter-of-fact representation of the course and succession of annual civil time from the first, this must be incorporated from the first. And it did not admit of a question that having once been incorporated in such a system, it must be retained in it, it never could cease to make a part of it; and that too not merely for the sake of consistency, or of the representation of one and the same succession perpetually, but for a much more cogent reason: viz. because this primitive type of the civil year itself, which enters our tables at first as the representative of the solar calendar of all mankind for the time being, has never ceased to be the civil solar calendar of some part of mankind or other from that day to this. It is impossible to say that annual civil time, having once begun to be reckoned every where in this particular form, has ever ceased to be reckoned in the same manner somewhere or other. Certain at least it is that there are parts of the world in which annual civil time still continues to be reckoned in this way, or in some way only accidentally different from this; and it is still more certain, (because it admits of being confirmed by many more proofs of the fact,) that no mode of reckoning annual civil time different from this is anywhere in existence at present, or ever was, (within the compass of human memory,) which was not originally derived from it, and may not yet, through more or fewer links of connection, be traced up to it.

It follows that, when bringing down this primitive and universal type of the reckoning of annual civil time according to its natural law, we are bringing down at the same time in their elementary and primordial state, in their seminal principles, in their archetypal form, if not in their actual conditions and constitutions from the first, the civil calendars

of all ages, and all countries, and all nations. Nor is it more unquestionable in point of fact that all existing distinctions of men, (even those which appear most widely discriminated in other respects) were originally summed up and comprehended in the loins first of one man, and afterwards of three men, than that the civil calendars of all such national divisions of mankind have been comprehended and embodied in this one type of all, the civil calendar first of Adam and next of the three sons of Noah; and through them the common birthright and common inheritance of their posterity everywhere.

SECTION IV.—*On the Julian type of the civil year, incorporated in the Fasti Catholici.*

But, as we have repeatedly observed, the true course and succession of time, perpetually exhibited in all its parts, and whether as always the natural or as always the civil, must be adapted to the actual state of the case at last as much as at first; and if we find the actual civil measure of annual time, which is in use at present, *de facto* to be the Julian or Gregorian, and no longer the primitive, we are bound to consider and treat it as if it had been Julian or Gregorian *de facto* from the first.

On this question then there could be no room for hesitation, because there could be none for choice. We must admit into our tables even from the first that form of civil annual time which we found to be in existence at last; and we must by some means or other begin with connecting the actual measure of this kind which was seen to be in existence at last, even with that which was actually in existence at first, notwithstanding the difference between them in other respects. The preliminary question, whether such a thing as the perpetual Julian or perpetual Gregorian reckoning of annual time was to be exhibited in our tables or not, had been decided by the course of events, and by the matter of fact. The problem which *we* had to solve was only the *mode* of the representation; i. e. in what shape the Julian or the Gregorian type of annual time was to be admitted into our tables, so much before its time, yet so as to be always the same in itself, and with reference to every thing else; and

as much the proper Julian or proper Gregorian type of civil annual time in the sense of natural, long before there was such a thing as the actual Julian or the actual Gregorian type of that kind, as ever at any time afterwards.

This problem we trust has been solved, not only with tolerable accuracy and with a certain degree of approximation to the truth perpetually, but with absolute exactness, and with the utmost possible degree of precision; not indeed by means of one and the same Julian or one and the same Gregorian type, (which before a certain time was impossible,) but by means of a series and succession of such types, all alike Julian or Gregorian in principle; all alike subject to the proper Julian or proper Gregorian law of administration; each of them for the time being the same properly Julian or properly Gregorian antitype of the same natural prototype, and though numerically distinct and individual, yet in every other respect identical; and at the proper point of time no longer distinguishable even from the actual Julian or the actual Gregorian form of the same thing itself.

The particular system of administration, by virtue of which this has been accomplished, must be reserved for future explanation[n]. We shall observe at present only, i. That if such a Julian or Gregorian typification of the natural year begins with being artificial, hypothetical, and positive, it ends with being real; and yet, if it is one and the same thing in itself throughout, it must be virtually as much real at first, even while it is only hypothetical, as at last, when it comes to be actual. ii. It must be one and the same thing in itself, because it is always the same typified form of that which has an actual existence from the first, and the same kind of actual existence too; viz. the mean natural or tropical year. For that which runs through all these modifications of external form, whether Julian or Gregorian, unchanged and unmodified in the least degree itself; and consequently that which makes one and the same thing of all these types of itself in succession, is this mean natural or tropical year: it being impossible that, while this continues the same, things which represent it alike all along, and bear the same relation to it perpetually, should not be the same too. iii. That this

[n] See the Introduction to the Tables, part i.

constant Julian or Gregorian type of annual civil time, incorporated in the same scheme and representation as the primitive, though actually different from it is not inconsistent with it. This Julian or Gregorian type of annual time is only another form of natural: and therefore it is as compatible with the primitive form of annual civil time as the natural year itself. And each being hypothetical or virtual only at first, they cannot interfere with the primitive, which is matter of fact or real at first: and when each of the former has begun to be actual, the latter in its turn has already begun to be hypothetical. In any case a cycle of day and night of one kind, like the primitive year, must be compatible with a similar cycle like the Julian or the Gregorian year: and if one of these, (as for instance the Julian or Gregorian,) is greater than the other, it is capable of serving as a standard of reference for the other. On which principle, (as it will be seen, we trust, hereafter,) though the ultimate standard of reference for the primitive equable year, (because for the civil year in every form and shape,) is the mean natural year; yet, as even the mean natural year admits of being constantly represented by the same kind of Julian type for the time being, so these Julian types themselves may be considered the proper standard of reference for the primitive equable year, (that is, for the primitive civil year,) as much as the natural year.

SECTION V.—*Conclusion and recapitulation. Five types of annual time incorporated in the Fasti Catholici perpetually.*

To sum up therefore what has hitherto been said, and to make an end of what we have still to say, on this point in particular: Five types or forms of annual time enter our tables from the first, and concurrently; i. The natural: ii. The Julian type of the natural: iii. The Gregorian type of the Julian: iv. The primitive equable, or the cyclical form of the equable: v. The Nabonassarian form of the cyclical.

Each of these types enters our tables at the common epoch of all, which is the beginning of the present system of things in this one of its constituent parts which we call Time; and each continues in our tables so long as we still continue to represent this part of the existing system and

constitution of things; which is in fact for 6004 years from its beginning itself. Each of these as a possible mode of the same thing is as admissible as the rest; and each as an actual mode of the same thing at one time or other is as much matter of fact as the rest. If any begins with being virtual it ends with being real: if any ends with being hypothetical it begins with being actual: and whether virtual or real, hypothetical or actual, each is absolutely the same thing in itself and in its proper relation to any thing else with which it is necessarily connected. We may judge of the truth of each, (even of those which were most hypothetical or merely proleptical at first,) after it has become matter of fact and real, from the evidence of our own senses; from our own observation and experience: and if they are seen to be confirmed by such testimony at last, what more convincing proof can we desire of their truth from the first? The law of dependence, connection, continuation, never once interrupted, which pervades them continually, the law of identity with themselves, and of similarity of relation to every thing else, must make them virtually if not actually as true at first as at last, and at last as at first. It cannot be otherwise; if time and the laws of time have always gone on and have always operated in the same way: i. e. if nature and the laws of nature have never been different from what they were appointed to be at first.

SECTION VI.—i. *The natural type of annual time.*

The first of these types is the natural type of mean annual time, the natural cycle of the ecliptic, and natural circle of the seasons; according to the standard and measure of its duration which has been already defined and laid down[o]. This standard, once ascertained on any principle and in any manner soever, in a case of this kind must be considered ever after fixed and invariable. It cannot or ought not to contain a second of mean solar or tropical time more or less than is thus assigned it at first, and by the assumption itself. True it is, an inaccurate standard may be fixed on at first; some limit and measure of mean annual time, of human designation, and not that of nature: but if there be such a thing as a

[o] Diss. ii. ch. iii. sect. i. iv.

mean natural standard of annual time, and if that has by any means been discovered and rightly assumed; it becomes from that moment a fixed and unalterable quantity, an unit or integer in the strictest sense of the term; incapable both of addition to and of diminution from itself, without an equal detriment to the truth, and without an equal offence against the constitution of nature.

That the standard on which *we* have fixed answers to this description of the abstract measure of mean natural annual time, especially in constant conjunction with civil, the necessary proofs, (with God's permission, and with his blessing on the progress of our undertaking meanwhile,) will be produced in due time. This natural type however, such as it is, even in this case can be referred to no prototype, distinct from itself, except one of those archetypal forms, (anterior to all secondary expressions of the same kind, to all creation and to all nature, properly so called,) which in their unoriginated and their individual simplicity existed from all eternity only in the Divine mind. It is the prototype of every thing else of the same kind, distinct from itself and secondary to it; but it has no type of its own, older than itself and distinct from itself, but one of these. It is as independent of human sanction as of human control. It emanates from no source and it owns no superior but God. It takes its laws and its prescription directly from the hands of its own Author. If it is not as unchangeable as the Divine Essence, (and that it could not be unless it made part of that essence itself,) it is at least as unalterable as the Divine will; and while that continues unchanged, this particular effect of that will must continue unchanged too.

This natural type then is the first of all our types of the same kind; not only because it is prior to the rest in the order of being, and different from them in its origin, but because it is and it must be the model of all the rest: it is and it must be the standard of reference for all others, which are secondary in the order of existence in comparison of prior, and human in point of origin in comparison of Divine. It is the type of types; the one natural prototype of all human antitypes how many soever and whatsoever they may be. It must be so, whether men choose that it shall be so or not.

They may contrive an infinite variety of civil types of annual time, and call them years if they please; but if they are not more or less the same with this, they are but fictions after all. Words and names can never make things. Nothing ever was or ever could be *the* year, but this natural type of annual time, and such civil ones as have corresponded to this. Nothing ever was, or ever could be, the circle of the sun in the heavens, or the round of the seasons on earth, but this.

SECTION VII.—ii. *The Julian type of the natural.*

The second of the types of annual time which enters our tables is the Julian type of the natural, described as above; an artificial, conventional, and so far purely civil antitype of this natural prototype; and therefore *positive* in contradistinction to *natural, human* in opposition to *divine, secondary* and *derivative* instead of *prior* and *unoriginated:* and yet in every thing essential to the correspondency of type and antitype, of prior and posterior, of original and derivative of the same kind, of natural, in one word, and positive; it is the same with natural. It is the positive or civil perpetually modelled on the natural; and at a given time and in a given instance not to be distinguished from the natural.

This Julian type then is the first of the civil or properly conventional substitutes of the natural measure of annual time, which are recognised in our Fasti; and though later in point of fact than the fourth, of which we shall give an account by and by, it is prior in the order of nature even to that; because it is more closely and more completely identified with the standard of nature even than that. We give it priority in our tables at least, because it is the proper civil representative of the natural type even from the first; and though it begins with being merely proleptic in that capacity, it ends with being actual.

It should be understood therefore of this Julian type of the Fasti, that it is the proper conventional representative of natural annual time, considered as one and the same thing in itself perpetually; and it is as much so before the actual Julian form of the civil year was yet in being as after. It should be understood consequently that as the continual representative

of the same invariable prototype it is as unchangeable and invariable in the abstract as this itself. Metaphysicians and logicians have long been familiar with the distinction of genus and species, and of species and individuals. They know that the same generic idea must run through every variety of specific form, and the same generic and specific idea, in conjunction, through every variety of individual; and yet must continue one and the same thing itself in all. This generic or this specific idea in itself is immutable and indestructible; but it is perpetuated in particular instances only by succession. And into how many individuals soever it enters, and in whatsoever order it enters them, it is the same thing in them all, and it makes the same thing of all.

Let these distinctions be applied to the Julian types of our Fasti; and it will be seen that they hold good of them too. Numerically indeed these are different; and individually they are discriminated by proper individuating characteristics; but in principle they are all the same. The conception of all and the constitution of all in the abstract are the same. The same natural idea runs through them; the same Julian idea penetrates and pervades them. Both are interwoven with a given individual type; and one as completely and as indissolubly as the other: and each is so critically adapted to the other throughout, that it is difficult to say whether the natural type for the time being has assumed the form of the Julian, or the Julian for the time being has been converted into the natural. And this, it must be admitted, in a case of this kind, is the perfection of type and antitype, of primary and secondary, of real and hypothetical, of natural and positive corresponding to natural. And in a case like this too, it is every thing which can be desired, every thing which could be proposed, and every thing which needs to be attempted.

SECTION VIII.—iii. *The Gregorian type of the Julian.*

The Gregorian type of the Fasti is only a variety of the Julian. It is the Julian in a different form; the difference residing in the accidents not in the essence of things. We shall have an opportunity however we trust elsewhere of

explaining ourselves on this point[p]. At present it is sufficient to observe that the Gregorian type of civil annual time would demand a place in the scheme and representation of annual time of that kind from the first, because it has actually found a place in the civil succession of annual time at last.

Gregorian civil time must be brought down from the first, in order to connect it with Gregorian civil time at last: and if so, according to the same rule and analogy all along. The case is just the same with Gregorian civil time as with Julian. Both are equally matters of fact at present. Both might have been equally matters of fact from the first. One can be carried back to the beginning of things in idea, as easily as the other: one can be brought down again from the beginning with as much facility as the other: and it is just as allowable to conceive the one hypothetical at first and actual at last, as the other.

The Gregorian type of civil annual time then must necessarily enter the representation of annual civil time on the largest possible scale, at first; because it must necessarily do so at last. But this is not the only reason why a type of that kind in general should be admitted into our own tables in particular. The true relation of the actual Gregorian to the actual natural type of annual time, as both are coexistent and both are in use together at present, is that of true civil in the sense of Julian, as perpetually equated to true annual in the sense of natural. Now this is the relation of our own Julian types of annual time to the natural also from the first. If so, there could be no difference between the Gregorian type of annual civil time at last, and our Julian types of natural annual time from the first. And this, in due time, will be seen to be actually the case.

We admit the Gregorian type into our tables then, along with the Julian, for two reasons; one, in order that the Gregorian rule at last may be regularly connected with a similar rule from the first; the other, because the Gregorian rule at last is necessarily and indissolubly connected with our Julian rule from the first. If there appears to be any inconsistency in thus speaking of our original Gregorian

[p] See the Introduction to the Tables, part i.

rule as distinct from our original Julian one; yet of the Gregorian rule at last as the same with the Julian one of our Fasti from the first; it will be seen, we trust, in due time to be only accidental.

It should be well understood however that, as the respective component parts of one and the same scheme and delineation of annual time from the first, these two types are so related to each other, that the Julian at first is the *primary*, the Gregorian is the *secondary*, form of the same thing. We obtain the Julian type in each instance from the standard of nature: we get the Gregorian from the Julian. As to the method of this derivation, it is explained in the Introduction to the Tables[q]. A simple and invariable rule suffices for the purpose. The plan and method of the Julian reckoning of annual time being given, the plan and the method of the Gregorian corresponding to it are virtually given also. A very slight change was sufficient to make the actual Julian reckoning actually Gregorian in A. D. 1582: and a similar and equally slight change is competent to render any of our Julian types for the time being Gregorian also. And it may be observed of both as thus exhibited constantly, one in conjunction with the other yet one as derived successively from the other; that at the proper time they pass simultaneously one into the form of the proper Julian, the other into that of the proper Gregorian, yet still continue to retain the same relation to each other as before.

SECTION IX.—iv. *The Primitive Equable, or Cyclical form of the equable.*

The fourth type of civil annual time which enters our tables is the primitive; the original form of civil annual time every where, and in constant connection with human society and with the established system of things from the epoch of the Mosaic creation downwards, as old as natural annual time itself.

It is not peculiar to this type to be made up of a certain number of integral cycles of day and night, for that is just as true of the Julian and of the Gregorian; but it is peculiar

[q] Loco citato.

to it to be made up of the *same* number of such cycles perpetually: for which reason, so far as chronologers hitherto have known any thing definite of this form of the civil year itself, they have generally agreed to give it the name of the *annus solaris æquabilis*, the equable, constant, or invariable solar year. In our Fasti we distinguish this fourth type of the civil year by the name of the *equable cyclical year*, in order to discriminate it from another type or form of the same kind of year in general which enters our tables as well as this, and of which we shall give a short account by and by.

It is peculiar also to this form of annual time, not only to consist of the same number of integral cycles of day and night perpetually, but likewise of the total amount of such cycles which can enter successively into the same natural year at once; so that were every natural year, in its order of generation and order of succession, to be measured perpetually by the number of integral cycles of day and night, or of integral periods of 24 hours of mean solar time, which entered it, it must be by a civil standard of this equable kind; and by none else.

This primitive type of the civil year then agrees with the natural in being always the same with it at a given time, as both are supposed to be measured by the cycle of day and night. It agrees with the natural in being invariable like that, and always the same with itself; in standing in need of no correction, no more than the natural, to enable it to serve the same use and purpose, and in the same way, perpetually. It is a complex or collection of natural units, each of which is the same integral and original element of time itself: and it is the *same* complex, the *same* sum, the *same* collection of such units continually. It can never contain either one more or one less than the number prescribed by the original relation of the first civil year of this description to the first natural, along with which it came into being; subject only to *one* condition; that of being the greatest number of such units or integers, (the primary elements of time itself,) which could enter both alike in their totality, and independently one of another in every thing but the order of succession. It is therefore the proper form of the

combination of the noctidiurnal cycle with the annual, (the annual of nature,) perpetually. It is consequently as nearly a natural type of annual time in the sense of civil, as possible; and quite as much so as the Julian types of our Fasti themselves. On these subjects however we shall still have much to say, in a different part of our work[r].

SECTION X.—v. *The Nabonassarian form of the cyclical.*

The fifth of the annual types incorporated in our Fasti, and the fourth of the civil, is the Nabonassarian form of this equable cyclical type itself; a form of the equable year in general much too important in every point of view to be dismissed with a cursory notice, and yet requiring too much to be said in order to its full and complete explanation, to allow us to enter upon it at present[r].

Suffice it to observe in general terms, that this Nabonassarian type of the equable year is a secondary form of that year; just as the Julian type of the Fasti is a secondary form of the natural year: and that this Nabonassarian type is as closely connected with the cyclical as the Julian type is with the type of nature. The relation of this Nabonassarian type of the primitive year to the cyclical is precisely that of our Julian types to the natural year. The primitive cyclical is to the Nabonassarian what the natural year is to the Julian. There is the same foundation in the reason of things for a relation of this kind in the former case, as in the latter. There is the same necessity for a Nabonassarian form of the equable cyclical type perpetually, as for a Julian one of the natural. There is the same constancy and the same fixedness in the cyclical type which serves as the prototype of the Nabonassarian, as in the natural which answers the same purpose in behalf of the Julian. There is the same fixedness or unfixedness, the same identity or the same individuality, in the Nabonassarian antitype of this cyclical prototype, as in the Julian of the natural perpetually. The Nabonassarian oscillates or circulates round the cyclical, just as the Julian does round the natural: but the former never deviates further from its centre of attraction than the latter. The Nabonassarian is just as variable, referred to itself, and just as

[r] See here also the Introduction to the Tables, part i.

invariable, referred to the cyclical, as the Julian, referred to the natural. The cyclical idea pervades every form of the Nabonassarian type alike; just as the natural idea does every form of the Julian: and yet the Nabonassarian has a proper idea of its own, which enters it in all its integrity, and under all circumstances of a common relation to the cyclical; just as the proper Julian principle enters every form of the Julian type, and under all circumstances of its relation to the natural also. And in due time this common Nabonassarian idea passes as completely into the actual Nabonassarian form of the equable year, as that common Julian idea does into the actual Julian.

In a word, all these things which we exhibit in our tables, in connection with each other and in juxtaposition, perpetually, *mutatis mutandis* are the same: a constant natural prototype of annual time, and a variable Julian antitype of the natural; or a constant natural prototype, and an invariable Julian antitype thereof, just as we choose to regard it: a constant cyclical type of equable annual time, and a variable Nabonassarian antitype of this cyclical one; or, if we will, a constant cyclical prototype, and an equally constant Nabonassarian antitype.

DISSERTATION IV.

On the Cycle of Day and Night, and on the Primitive rule of reckoning it.

CHAPTER I.

SECTION I.—*On the diurnal revolution; or the phenomena of the alternation of day and night in general.*

IF we may assume that, at the vernal or the autumnal equinox in the tropical year, a given point, or series and line of points, (all situated in the circumference of the same great circle, passing through the poles of the earth, and therefore in the plane of what would be called the same terrestrial meridian,) by virtue of the diurnal rotation had been brought to the verge of the sensible horizon in the west; then, were there no such thing as the refractive property of the atmosphere to make the light of the sun visible a longer or a shorter time before the actual appearance of the sun itself, the centre of the sun, by virtue of the opposite motion of the heavens, would have been brought at the same moment to the verge of the sensible horizon in the east: and the perception of daylight being dated from that appearance, it would be *morning* or the beginning of day for the meridian in question, and for all those parts or localities on the surface of the earth through which it passed.

When this point or series of points began to move forwards from the west, the centre of the sun would begin to move forwards from the east. Six hours of mean solar time afterwards exactly, one would be in the middle of the sky between the horizon in the west and the horizon in the east, and the other in the middle of the sky between the horizon in the east and the horizon in the west. In this situation the line of terrestrial points would be immediately under the centre of the sun. The plane of the meri-

dian produced would pass through the centre of the sun. The terrestrial meridian would now have attained *to* and would be under its proper zenith: the sun would be culminating, and at its highest point of elevation above the line of terrestrial points in question: and for this line of points or this meridian it would now be the middle of the day, mid-day, high-day, or noon.

When the terrestrial meridian began to move from this point towards the east, the centre of the sun would begin to move away from it towards the west. Six hours afterwards exactly, the terrestrial meridian would be on the verge of the sensible horizon in the east, and the centre of the sun on that of the sensible horizon in the west: and were there, as before supposed, no power of refraction in the atmosphere, this point of time to the meridian in question would be not merely evening as opposed to morning, or sunset as opposed to sunrise, but the end of daylight as opposed to darkness; the end of day, as day, and the beginning of night, as night.

Six hours after this exactly, the motion of the earth about its own axis would have brought this line of points from the verge of the sensible horizon in the east, to the middle point between the horizon in the east and the horizon in the west. The terrestrial meridian in this situation too would again be in its normal position. Its plane produced through the centre of the earth would again pass through the centre of the sun. But it would now be directly under its proper nadir, or lowest point, as before it was under its zenith, or highest: and the entire material mass of the earth being interposed between this line of points and the centre of the sun, this moment would be to that meridian the middle of night, or midnight, the opposite time to that of noon; that moment in the successive alternation of light and dark, when the privation of light is greatest and most complete; and darkness is most intense.

Six hours more after this too, the same line of points would again be brought to the verge of the horizon in the west; and at the same moment, the centre of the sun to the verge of the horizon in the east. It would again cease to be night and begin to be day as before to this meridian: and the same cycle of phenomena, which we have just been

tracing for a given meridian through one entire revolution of the earth about its own axis, would begin at this moment for that meridian again, in order to be repeated in the same manner, or nearly in the same, as before.

SECTION II.—*On the distinction of the natural and of the artificial day.*

Now this cycle of phenomena in the complex, this round and succession of appearances of a certain kind, is what is every where meant by the alternation of day and night, or of night and day: and these terms have been so used (and therefore so understood) every where, that by *day* the first half of this cycle, and by *night* the second has always been intended. The periods or points of time in this cycle which are most opposed to each other, and most strikingly contrasted one with another, are these two; the first visible appearance of the sun in the eastern horizon, and the last visible appearance of the sun in the western; after the former of which it ceases to be dark and begins to be light, and after the latter it ceases to be light and begins to be dark. And as mankind have had a perpetual interest in these two things, the presence and the absence of light; they have every where and at all times agreed to divide the entire cycle of changes and alternations in question into two halves, one of them characterized by the presence, the other by the privation, of light; and one of them called day, the other called night[s].

In the ordinary sense of these terms then, day is the interval from morning till evening, from sunrise to sunset; night is the interval from evening till morning, from sunset to sunrise. The day at least in all languages is the interval of time during which it is sensibly light; and the night is that during which it is sensibly *not* light, that is, it is dark. The beginning of day is the moment from which the light appears sensibly to predominate over the dark, and the beginning of night is the reverse; the moment from which

[s] Hyginus, Poetic. Astronomic. iv. cap. xix.: Quoniam tempus omne metimur die et nocte, mense et anno. de quibus diem nobis diffinierunt quamdiu sol ab exortu ad occasum perveniat; noctis autem spatium constituerunt esse quamdiu sol ab occasu rursum ad exortum revertatur.

Theodosius, *περὶ ἡμερῶν καὶ νυκτῶν* I. *Προοίμιον*, β′. p. 25: Καὶ χρόνον ἡμέρας καλεῖ (sc. ὁ Θεοδόσιος) τὸν ἀπὸ ἀνατολῆς ἕως δύσεως, νυκτὸς δὲ τὸν ἀπὸ δύσεως ἕως ἀνατολῆς.

darkness begins sensibly to predominate over light. At certain parts of the surface of the earth, (for instance, under the line, or at the equator,) this moment is the first or last actual appearance of the sun in the horizon, or as nearly so as possible. At points removed more or less from the equator, it may be proportionably earlier in one of these cases, and later in the other, according to the difference in the length of twilight, before sunrise and after sunset, for the particular climate in question. But the proper sense of day as opposed to night, and of night as opposed to day, is every where the same; the length of time during which it is perceptibly light, and not-light, (that is, dark,) respectively. And these intervals being determined by the laws of nature, and discriminated asunder by strictly natural phenomena, it cannot or ought not to admit of a question, that the day, in this sense of the word, is a natural division of time, and the night, in the sense opposed to it, is a natural division too.

As a measure of time however, and as entering perpetually into the constitution of the civil calendar, the word *day* is so used as to include the night. *Day* is equivalent to *day* and *night*. The civil day comprehends both halves of the noctidiurnal cycle, both the natural interval of daylight assigned to the one, and the natural interval of darkness assigned to the other. In this enlarged sense, the day is a *positive* not a *natural* division of time; and the word itself is what logicians would call *nomen secundæ intentionis*.

Naturalis dies est tempus ab oriente sole ad solis occasum: cujus contrarium tempus est nox, ab occasu solis usque ad exortum. civilis autem dies vocatur tempus quod fit uno cœli circumactu, quo dies verus et nox continetur[t].—Dies quippe cum noctibus mensium spatia complere, menses vicissim annorum orbes involvere[u].—Nam cum cœlum omne simplici circumactu volvatur, nocte dieque distinctum[x].—Dierum etiam noctiumque curriculis ordiuntur menses, texunt annos (horæ.)[y]—Ἡμέρα λέγεται διχῶς· καθ' ἕνα μὲν τρόπον χρόνος ὁ ἀπὸ ἀνατολῆς ἡλίου μέχρι δύσεως· καθ' ἕτερον δὲ τρόπον ἡμέρα λέ-

t Censorinus, De Die Natali, xxiii.

u Apuleius, De Habitudine, opp. ii. p. 166. (Biponti.)

x Idem, De Mundo, opp. ii. 273.

y Idem, ibid. 267.

γεται χρόνος ὁ ἀφ' ἡλίου ἀνατολῆς μέχρις ἡλίου αὖθις ἀνατολῆς· ἔστι δὲ ἡμέρα κατὰ τὸν δεύτερον τρόπον τοῦ κόσμου περιστροφή [z].—Dies naturalis apud astronomos et Persas et Græcos est ab ortu centri solis ad occasum ejus: apud Mohammedanos (est) ab exortu veræ auroræ usque ad completum occasum corporis solaris [a].—Dies civilis duplex est: unus verus, qui ab astronomis imperii nostri et terrarum occidentalium a medio die ad medium diem sequentem statuitur: sed ab astronomis Chataiæ et Iguræ a media nocte ad mediam noctem insequentem; ab Arabibus et Mohammedanis a principio noctis ad principium noctis sequentis: ab aliis ab initio diei ad initium diei sequentis [b].

In all these descriptions and designations the civil day is meant, in contradistinction to the natural; and by the civil day one entire revolution of the earth about its own axis, reckoned in some manner or other, and therefore consisting of one natural day and of one natural night, or of similar parts of each. Neither can it be denied that the day in this sense too is natural. The diurnal revolution of the earth is a natural process, and one of the most invariable in nature: and because it is both natural and invariable, astronomers and chronologers have been inclined to invert the distinctions explained above, and to call the natural day the artificial, and the civil or artificial the natural; a distinction said to have been first introduced by John of Lincoln, surnamed De Sacro Bosco [c] (of holy bush,) or as Scaliger styles him, De Sacro Busto [d] (of holy rood): though the principle of the distinction appears in Isidore of Seville, long before his time. Dies legitimus viginti quatuor horarum est, usque dum dies et nox spatia sui cursus ab oriente (sole) usque ad alium orientem solem cœli volubilitate concludat. abusive autem dies unus est spatium ab oriente sole usque ad occidentem [e].—Dies gemine appellari solet. proprie a solis ortu donec rursus oriatur: abusive a solis ortu usque quo eat ad occasum [f].

[z] Geminus, v. Uranologium, 22. A.

[a] Epochæ Celebriores, Prolegomena, 4.

[b] Ibid.

[c] Beveridge, Institt. Chronologicæ, i. cap. v. i. p. 25. See the treatise De Sphæra of Sacro-Bosco himself, cap. v.

[d] De Emendatione, iv. 326. C. D.

[e] Origines, v. 30. B–D. p. 44: De Diebus.

[f] De Natura Rerum, i. 246. G.

There is no objection to this mode of speaking *per se.* The civil day, so understood, is natural. The thing denoted by it is one and entire in itself, (i. e. a single complete revolution of the earth,) though composed of two parts, a day as such and a night as such. But to enlarge the proper sense of the word day so as to take in the night also offends against the common sense of mankind, and against the usage of speech everywhere. To restrict the epithet of natural to *day* in this enlarged sense, and to call *day,* in the sense opposed to this, artificial, would be virtually to deny the sensible distinction of light and dark; or to allow it no practical effect, such as it always has had, and always must have, everywhere. It must be evident on reflection that *day,* in the civil acceptation of the term, grew up by degrees out of *day,* in the sense of the natural; and that it is only a more compendious and convenient way of expressing by one word, what must otherwise have been expressed by two, (one for the day and one for the night,) in conjunction. The civil day then, even in this sense, may be natural; and yet the natural day, even as opposed to it, is not and cannot be artificial.

SECTION III.—*On the fourfold distinction in the epoch of the civil day, sunset or sunrise, noon or midnight.*

Every actual revolution of the earth about its own axis thus comprehending one natural day and one natural night; if such a revolution is to be designated the civil day, it follows that every civil day must be made up of one natural day and of one natural night. And were the length of the natural day always equal to that of the natural night, the civil day would always be double the natural day. If the order of the natural day and natural night too were invariably so established, that the night must precede the day; then the proper denomination of the civil day, as made up of both perpetually, would be *night-day* in English, *Āreb-bekour* in Hebrew, *νυχθήμερον* in Greek, and *noctiduum,* or something to that effect, in Latin, though no such word actually occurs in that language. If the order of succession were such that the day must always precede the night; the proper appellation of the civil day, made up of both, would be *day-night* in

English, *ἡμερονύκτιον* in Greek[g], *Bekour-ăreb* in Hebrew, and (though no such term actually occurs in Latin) *dinoctium* in Latin.

It is peculiar however to the natural day and to the natural night to be nowhere on the surface of the earth absolutely equal, because of refraction and twilight; to be relatively equal or nearly so, (i. e. with the exception of that difference,) only at the equator; to be the same taken together within certain limits only for particular portions of the surface of the earth, called parallels of latitude, or climates; to vary, one in comparison of the other, at different seasons of the year, even for these. It is found from experience that the day is longest at the summer solstice, the night at the winter solstice; that from one of these terms in the tropical year to the other, the length of each is continually changing, one growing longer as the other grows shorter, and *vice versa;* and that at two seasons only, the equinox of spring and the equinox of autumn, does there appear to be no difference between them; and day, reckoned from the first manifestation of the sun in the morning, is equal to night, reckoned from its last appearance in the evening. But the civil day, if synonymous with one entire revolution of the earth about itself, is and must be an invariable quantity. This revolution being referred to the mean sun perpetually, the civil day must be estimated every where alike at 24 hours of mean solar time. And this, no doubt, is the principal reason, if not the only one, why astronomers and chronologers have been so desirous to call the civil day, thus defined and limited, *natural,* and the natural day, in its proper sense, *artificial.*

This being the case, it can make no difference to the absolute interval of mean time which must be supposed to be meant by the civil day, from what point or epoch of this period of 24 hours it may be reckoned. *Νυχθήμερον (δὲ) ἁπλῶς ἡ τοῦ ἡλίου ἀπό τινος τμήματος, ἤτοι τοῦ ὁρίζοντος ἢ τοῦ μεσημβρινοῦ, πάλιν ἐπὶ τὸ αὐτὸ ἀποκατάστασις*[h]. We have agreed to restrict it, in a given instance, to the return of the sun

[g] *Νομίζεται παῖς Οὐρανοῦ καὶ Γῆς (ὁ Κρόνος) ὅτι ἐκ τῆς ἐπιτολῆς τῶν ὑπὸ γῆν καὶ ὑπὲρ γῆν ἄστρων ὁ χρόνος γίνεται· διὰ γὰρ τούτων καὶ ἡμερονύκτιον καὶ μῆνα καὶ καιρὸν διορίζομεν.* Etymologicum Magnum, Κρόνος.

[h] Magna Compositio, iii. viii. 206.

to the same meridian: this definition of Ptolemy's extends it to the horizon also. And the latter at first sight would seem to be the more natural of the two, if the civil day is never to contain either more or less than one natural day and one natural night: in which case it must be reckoned perpetually from sunrise to sunrise, or sunset to sunset; i. e. as Ptolemy expresses it, from the returns of the sun to the horizon continually. But the actual point of sunrise or sunset, even for the same place, referred to the horizontal circle perpetually, is always changing its place; the point of mean noon or of mean midnight, for a given locality on its proper meridian, is fixed; so that, as Le Pair Daunou observes[i], Midi et minuit sont pour chaque lieu des instants fixes durant tout le cours de l'année. And though the civil *νυχθήμερον*, as reckoned from noon to noon or from midnight to midnight, must be made up of halves of two natural days and of two natural nights respectively, this is the only method of reckoning it, by virtue of which one civil *νυχθήμερον*, or period of 24 hours of mean solar time, and one entire revolution of the earth from the mean sun to the mean sun again, for a given locality, shall coincide perpetually, and be always the same with each other.

The natural *νυχθήμερον* then has properly two beginnings, and no more, sunset and sunrise; referred to the former of which, it answers to the idea of the *night-day*, and referred to the latter, to that of the *day-night*. The civil *νυχθήμερον* takes in two more, noon and midnight; referred to the former of which, it would be as properly *day-night*, as *night-day* referred to the latter. The possible beginnings of the civil day then, or of the period of 24 hours defined as above, designated by nature and by the reason of things, are four, and no more; sunset and sunrise, noon and midnight. The matter of fact everywhere is and has been agreeable to these distinctions. The civil day has always been reckoned from one or other of these four epochs. The first thing to be done is to produce the necessary testimony to this effect; though many of our readers, probably, are familiar with that already. But we must ask permission even of these to pro-

[i] Vol. iii Leç. ii. p. 63. Cf. Scaliger, De Emendatione, ii. 129. D. 130. A. Ptolemy, Magna Compositio, lib. iii. cap. viii. 208. lib. vi. cap. iv. 387.

ceed systematically; and to state our premises in every instance before we reason from them.

SECTION IV.—*Testimonies.*

i. Aulus Gellius[k]: Quæri solitum est, qui noctis hora tertia quartave sive qua alia nati sunt, uter dies natalis haberi adpellarique debeat; isne, quem nox ea consecuta est, an qui dies noctem consecutus est. M. Varro in libro Rerum Humanarum quem de diebus scripsit, "Homines," inquit, "qui ex media nocte ad proximam mediam noctem in his "horis viginti quatuor nati sunt, una die nati dicuntur." quibus verbis ita videtur dierum observationem divisisse, ut qui post solis occasum ante mediam noctem natus sit, is ei dies natalis sit, a quo die ea nox cœperit: contra vero, qui in sex noctis horis posterioribus nascatur, eo die videri natum, qui post eam noctem diluxerit*.

Athenienses autem aliter observare idem Varro in eodem libro scripsit; eosque a sole occaso, ad solem iterum occidentem, omne id medium tempus unum diem esse dicere. Babylonios porro aliter; a sole enim exorto ad exortum ejusdem incipientem totum id spatium unius diei nomine adpellare: multos vero in terra Umbria unum et eumdem esse diem dicere, a meridie ad insequentem meridiem; "quod quidem" inquit "nimis absurdum est." nam qui kalendis hora sexta natus est apud Umbros, dies ejus natalis videri debebit et kalendarum dimidiatus et qui est post kalendas dies, ante horam ejusdem diei sextam.† populum autem Romanum ita, uti Varro dixit, dies singulos adnumerare a media nocte usque ad mediam noctem, multis argumentis ostenditur[l].

* The meaning of these distinctions is apparent. The civil day being reckoned from midnight to midnight, the last half of one natural night, and the first half of another, and the whole of one natural day, comprehended between the two, made up only one legal or civil day. But this was the Roman rule.

† There could not be any more absurdity in reckoning the civil day from noon to noon, than from midnight to midnight: so that this Umbrian rule, in principle, would be just as defensible as the Roman. Varro probably meant that this Umbrian rule was absurd, because it was not compatible with the Roman; which at this time was, no doubt, the legal or civil rule all over Italy.

[k] Noctes Atticæ, iii. 2. Cf. Macrobius, Saturnalia, i. iii. p. 207.

[l] Cf. Censorinus, De Die Natali, xxiii. Macrobius, Saturnalia, i. iii. p. 207–209. Gaza, De Mensibus, xx. Uranologium, 310. B—D.

ii. Pliny[m]: Ipsum diem alii aliter observavere. Babylonii inter duos solis exortus; Athenienses inter duos occasus: Umbri a meridie in meridiem: vulgus omne a luce ad tenebras. sacerdotes Romani, et qui diem diffiniere civilem, item Ægyptii et Hipparchus, a media nocte in mediam.

iii. Censorinus[n]: *De die Civili:* Hujusmodi dies ab astrologis et civitatibus quatuor modis definitur. Babylonii quidem a solis exortu ad exortum ejusdem astri diem statuerunt. at in Umbria plerique a meridie ad meridiem. Athenienses autem ab occasu solis ad occasum. ceterum Romani a media nocte ad mediam noctem diem esse existimaverunt.—Incipiam a nocte media, quod tempus principium et postremum est diei Romani[o].

iv. Servius[p]: Dies est plenus qui habet horas viginti quatuor; nam et nox pars diei est ... hic autem dies secundum Ægyptios inchoat ab occasu solis; secundum Persas ab ortu solis; secundum Umbros, Etruscos, et Athenienses a sexta hora diei; secundum Romanos a media nocte*....hæc autem plene exsequuntur et Cicero in Auguralibus, et Aulus Gellius in libris Noctium Atticarum, iii. 2. hoc etiam illa res Juris indicat, quod cum tribuno plebis abnoctare ab urbe non liceret, licebat tamen exire post noctem mediam et ante mediam reverti[q].

v. Isidorus Hispalensis[r]: Dies secundum Ægyptios inchoat ab occasu solis: secundum Persas ab ortu solis: secundum Athenienses a sexta hora diei: secundum Romanos a media

* Cf. ad Æneid. x. 215.

> Jamque dies cœlo concesserat; almaque curru
> Noctivago Phœbe medium pulsabat Olympum.

Describit autem mediam noctem, et dicit finitum diem secundum Romanum ritum, qui a media nocte diem numerant, et noctem similiter a media die.

Hence Ovid, of the point of noon, as the middle point between two midnights, according to the Roman rule:

> Jamque fere medius Titan venientis et actæ
> Noctis erat, spatioque pari distabat utrimque.
>
> Metamorphos. x. 174.

Though this may be referred to noon, as the middle point between sunrise and sunset also.

m Historia Naturalis, ii. 79.
n De Die Natali, xxiii.
o Ibid. xxiv.
p Ad Æneid. v. 738.
q Cf. ad Æneid. vi. 255. 535.
r Origines, v. 30: 40. C. De Diebus.

nocte.—Initia diei alii a solis ortu putant; alii ab occasu; alii a media nocte. nam Chaldæi a solis ortu diei initium faciunt, totum id spatium unum diem adpellantes; Ægyptii autem ex initio noctis sequentis diei originem tradunt. Romani autem a medio noctis oriri diem volunt, et in medio noctis finiri[s].

vi. Beda[t]: *De die:* Apud Chaldæos ab ortu solis usque ad ortum solis: apud Ægyptios ab occasu solis usque ad occasum solis: apud Hebræos ab hora sexta usque ad horam sextam . . . apud Romanos a media nocte usque ad mediam noctem.—Dies secundum Hebræos et Athenienses a sexta hora diei incipit; quia Hebræi secundum lunam numerant, et sic computant quasi media die ætas lunæ commutetur aut accendatur. secundum Chaldæos et Persas ab ortu solis incipit dies, quia Chaldæi primum solem adorabant. secundum Ægyptios dies incipit ab occasu solis, quando vesper stella oritur, quæ dicitur alio nomine Lucifer; et illam stellam Ægyptii primum adorabant. secundum Romanos et Persas dies naturalis est a media nocte usque ad mediam noctem, propter illam auctoritatem Hieronymi, qua dixit quia in media nocte factus est mundus, et in media nocte iterum destruetur[u].—Nam Hebræi, Chaldæi, et Persæ . . ., juxta primæ conditionis ordinem, diei cursum a mane inchoantes ad mane deducunt, umbrarum videlicet tempus luci supponentes. at contra Ægyptii ab occasu usque ad occasum; porro Romani a medio noctis in medium umbræ (corr. in medium. Umbri) et Athenienses a meridie in meridiem dies suos computare maluerunt[x].

vii. Lydus[y]: Ἡ φυσικὴ ἡμέρα ἀπὸ τῶν ἡλίου ἀνατολῶν ἕως δυσμῶν λαμβάνεται· ἀλλ' οὐ παρὰ πᾶσιν οὕτως. Βαβυλώνιοι μὲν γὰρ ἀπὸ ἀνατολῶν ἡλίου ἕως αὐτῶν λαμβάνουσι δυσμῶν, νυκτὸς οὐδ' ὅλως μνήμην ποιούμενοι, οἷον οὐ καθ' ὑπόστασιν ἀλλὰ μᾶλλον κατὰ συμβεβηκὸς γινομένης· Αἰγύπτιοι δὲ ἀπὸ ἑσπέρας τὴν ἐπιφοιτῶσαν συναριθμοῦνται ἡμέραν, ἕως αὖθις ἑσπέρας, διὰ τὸ πρὸ τῆς τοῦ παντὸς διακοσμήσεως σκότον ὑποτίθεσθαι τοὺς κοσμογράφους,

s De Natura Rerum, i. 246. H.

t Opp. i. 121. De Divisionibus Temporum.

u Ibid. i. 122. De Divisionibus Temporum.

x Ibid. 123, cf. 496, 497, Computi Ratio iii: ii. 56, 57, De Temporum Ratione, iii.: where the Umbri are mentioned as following the same rule with the Athenians. Also, ii. 206. De Temporibus, ii.

y De Mensibus, ii. 1. p. 13. l. 3.

νύκτα τε πάντων μητέρα ὀνομάζειν . . . . οἵγε μὴν Οὖμβροι, ἔθνος Ἰταλικὸν, ἀπὸ μεσημβρίας εἰς μεσημβρίαν τὴν ἡμέραν ἔλαβον, ὥσπερ καὶ οἱ ἀστρολόγοι ἐπὶ ταῖς γενέσεσιν.

viii. Auctor Anonymus[z]: *Ἐπεὶ δὲ εἰς τὸ ἡμερονύκτιον κατηντήσαμεν, χρεὼν εἰπεῖν καὶ ὅπως τοῦτο λογίζεται παρ' ἑκάστῳ τῶν ἐθνῶν, εἶτ' οὖν ὅπως ἡ ἡμέρα μετρεῖται. Βαβυλώνιοι μὲν οὖν ἀπὸ ἀνατολῶν ἡλίου μέχρι δυσμῶν, αὐτοῦ τὴν ἡμέραν ὁρίζονται, τῆς νυκτὸς μηδόλως μνείαν ποιούμενοι, ὡς ἀνυποστάτου πράγματος. Αἰγύπτιοι δὲ ἀπὸ ἀρχῆς ἑσπέρας, μέχρι τῆς ἐπιούσης πάλιν ἑσπέρας· τὴν προλαβοῦσαν δηλονότι νύκτα μετὰ τῆς ἐπακολουθούσης ἡμέρας συνενοῦντες, καὶ μίαν ἀμφοτέρας ὀνομάζοντες ἡμέραν, ἀρχόμενοι δὲ πρότερον ἀπὸ τῆς νυκτὸς, διὰ τὸ ἀρχαιογονώτερον εἶναι τὸ σκότος τοῦ φωτὸς, καὶ πρὸ τῆς διακοσμήσεως τοῦδε τοῦ παντὸς ἔρεβος καὶ σκιὰν προϋποτίθεσθαι τοὺς κοσμογράφους, καὶ τὸ τὴν νύκτ' εἶναι μητέρα πάντων· ὅθεν καὶ οἱ μυθικοὶ ἀπὸ Λητοῦς τεχθῆναι τὸν Ἀπόλλωνα λέγουσιν. Οὖμβροι δὲ, ἔθνος Ἰταλικὸν καὶ ἀστρολόγον, ἀπὸ μεσημβρίας τὴν ἀρχὴν τῆς ἡμέρας λαμβάνουσιν, ἕως πάλιν τῆς ἄλλης ἡμέρας μεσημβρίας μίαν λέγοντες ἡμέραν. Ῥωμαῖοι δὲ τὸ μὲν πρῶτον ἶσα τοῖς Βαβυλωνίοις καὶ αὐτοὶ τὴν ἡμέραν μόνην ἀπὸ ἀνατολῶν ἡλίου μέχρι δυσμῶν ἡμέραν ὁρίζονται, τὴν νύκτα μηδὲν λογιζόμενοι· ὕστερον δὲ ἀπὸ μέσης νυκτὸς, ἤγουν τῆς ἀρχῆς τῆς ἑβδόμης ὥρας αὐτῆς, καὶ ἕως τῆς μέσης πάλιν τῆς ἐπιούσης νυκτὸς, ἐτύπωσαν τὴν ἡμέραν καὶ νομίζεσθαι καὶ ὀνομάζεσθαι.*

ix. Shâh Cholgji[a]: Mahommedani, et omnes alii qui menses a phasibus lunaribus inchoant, diem civilem ab occasu solis inchoant . . . adeo ut nox diei præmittatur. Græci . . ab ortu solis; adeo ut dies nocti præmittatur[b]. astronomi nostri . . . a media die . . . Indi autem, et aliqui ex Persis, et Chaldæi . . . . a media nocte[c].

SECTION V.—*Observations on the above testimonies.*

These statements and testimonies, it is evident, cannot all be considered original. Most of the later are taken from the earlier, and only repeat the same things. We will assume however that as far as they are consistent with one another

[z] Apud Anecdota Parisiensia, (Cramer. Oxonii, 1839.) i. 380, 27—381, 17. Ἐκλογαὶ διαφόροι.

[a] Apud Hyde, De Religione veterum Persarum, xvii. p. 211.

[b] Cf. Gaza, De Mensibus, xxi. Uranologium, 310 C.

[c] Cf. Epochæ Celebriores, Prolegomena, 4.

they are equally true; and that the matter of fact, to which each of them deposes, is equally well authenticated by it.

It appears from all, as far as they go, that the civil day in the astronomical or chronological sense never has been reckoned among mankind, except from one or other of four epochs or beginnings, sunset and sunrise, noon and midnight. The question which *we* have to consider is whether any of these four modes of reckoning it was in use from the first; or in use most generally; or for the longest time: whether any of them can be considered *primitive* in comparison of the rest, and coæval with human society, and for a time coextensive too: and if so, which.

And this question we propose to consider as one of fact; which must be decided as other questions of fact are wont to be; viz. by testimony. If it should turn out, as the result of our inquiries into this matter of fact, that there is one of these four modes in particular which constituted the original rule of the noctidiurnal cycle; one which is the oldest, the most universal, and the best authenticated of all; in contradistinction to which each of the other three is comparatively recent, and local, and circumscribed; there will be no question that this is that rule which we are bound to adopt in our Fasti from the first, and to retain to the last; even though, for the special reasons of the case, we should find it necessary also to incorporate some other in the same scheme with it; and to bring that too down along with this perpetually.

CHAPTER II.

SECTION I.—*On the noctidiurnal rule of Scripture.*

We will begin with the rule of the most Holy Scripture.

There is no express command discoverable in Scripture, which prescribes for the use of the children of Israel any particular mode of reckoning the civil day; as there is, to fix the beginning of the civil year[d], and virtually even to define and determine the kind and form of the civil year

[d] Exodus xii. 2.

which they were to observe[e]. From the fact of this omission, (which is no doubt significant,) we infer not that Scripture does not suppose a proper method of reckoning the civil day to be necessary for them; but that it adopts and sanctions the method already in use among them, the method to which they were already accustomed, and with which they were already familiar; whatsoever that was. And though there is no positive testimony in the letter of Scripture even to this preexisting rule, there are abundance of intimations in Scripture, from the time of the Exodus downwards, from which it may be collected what the rule, which it presupposes and recognises every where, and which it adopts itself, must have been.

Indeed commentators are so generally agreed that one rule of the noctidiurnal reckoning, and one only, is recognised in Scripture, that it must be superfluous to enter upon any formal proof of the fact. Let one example suffice; supplied by the injunction of abstinence from the use of leaven, for a certain number of days and nights, which gave occasion to the Levitical azyma, or feast of unleavened bread: an injunction, *positive* of its kind, and imposed for the first time when the ordinance of the passover itself was instituted.

"Seven days shall ye eat unleavened bread; even the first day ye shall put away leaven out of your houses: for whosoever eateth leavened bread, from the first day until the seventh day, that soul shall be cut off from Israel[f].—Seven days shall there be no leaven found in your houses; for whosoever eateth that which is leavened, even that soul shall be cut off from the congregation of Israel, whether he be a stranger or born in the land. Ye shall eat nothing leavened: in all your habitations ye shall eat unleavened bread[g]."

These words intimate plainly what was enjoined and what was required for these seven days; viz. from the first to the last thereof a total abstinence from leaven. But how were these days to be reckoned? "In the first *month*, on the fourteenth day of the month at even, ye shall eat unleavened

[e] Numbers x. 10. xxviii. 11. xxix. 1. Leviticus xxiii. 24.

[f] Exodus xii. 15.

[g] Ibid. 19, 20: cf. Lev. xxiii. 5, 6: Numb. xxviii. 16, 17: Deut. xvi. 3–8: Numb. ix. 10–14.

bread; until the one and twentieth day of the month at even[h]." From the fourteenth day of the month at even to the twenty-first day of the month at even also[i]. The seven days therefore were to be reckoned from the end of the fourteenth *exclusive* to the end of the twenty-first *inclusive:* that is, the fifteenth dated from evening was the first of these days, and the twenty-first, supposed to expire at evening, was the last.

The construction thus put on these words is confirmed, and the implicit recognition of a preexisting rule of the noctidiurnal cycle is still further illustrated, by the only instance in which the limits of the *νυχθήμερον* are defined by the legal injunction itself; that of the tenth day of the seventh month, the day of the fast, and also of the atonement or expiation. "On the tenth *day* of this seventh month, *there shall be* a day of atonement: it shall be an holy convocation unto you: and ye shall afflict your souls...and ye shall do no work in that same day...It *shall be* unto you a sabbath of rest, and ye shall afflict your souls: in the ninth *day* of the month at even, from even unto even, shall ye celebrate your sabbath[k]."

The tenth day of the seventh month is thus supposed to begin on the ninth at even, and the limits of the particular noctidiurnal cycle commensurate with it to be *from even to even*, from even on the ninth to even on the tenth; that is, from sunset on the ninth to sunset on the tenth. Such a cycle was strictly a *night-day* not a *day-night:* a *νυχθήμερον* not an *ἡμερονύκτιον*. And this definition, as we have observed, is peculiar to this one night-day; probably because as this was destined to be sabbatic not by virtue of its place in the hebdomadal cycle, but by appointment and prescription on whatsoever day of the week it might fall, it was considered proper to define its limits accordingly, as those of an ordinary *νυχθήμερον* indeed, but withal of an extraordinary sabbath, or *νυχθήμερον of rest*, too.

This mode then of reckoning the civil day is recognised in

[h] Exodus xii. 18.

[i] Origen, Operum ii. 121. F. 122. A. Selecta in Exodum, (xii. 3): Ἀπὸ τῆς δεκάτης, φησὶ, λαμβάνειν πρόβατον καὶ τρέφειν ἕως ιδ΄.... καὶ τῇ ιδ΄ θύεται, ἀνάμεσον τῶν ἑσπερινῶν ἀρχομένης τῆς ιε΄, ὡς γίνεσθαι ἀπὸ τῆς λήψεως μέχρι τῆς θυσίας ἡμέρας ε΄ ὅτε πλῆρές ἐστι τῆς σελήνης τὸ φῶς.

[k] Leviticus xxiii. 27, 28, 32.

Scripture from as early a date as that of the Exodus; and in such a manner as to imply that it was the ordinary mode of reckoning it among the Israelites at least even before the Exodus. From the rule of the Israelites in this respect, at the time of or before the Exodus, it is easy to ascend to that of the patriarchs both after and before the flood; and through the rule of the patriarchs to the beginning of things, and to the actual commencement of the reckoning of the cycle of day and night itself.

And here, if the terms of a plain historical narrative are to be construed in their simple and obvious sense, the antiquity of this rule, and its right to be considered the *primary* rule of all, appears from the testimony of the fifth verse of the first chapter of Genesis, in the summary there given of the work of the first day of creation itself; a work, which consisted in part in the separation of light and darkness, that is, in bringing into being for the first time in connection with the present system of things the sensible distinction of night and day itself. "And the evening and the morning were the first day:" or, more closely to the idiom of the original, "And there was evening, and there was morning, one day," meaning the *first* day.

This very first day of all then was composed of an evening and a morning; the former the natural night, the latter the natural day: and these its component parts preceded and followed each other, first the evening, and then the morning; first the natural night, and then the natural day. This first day then was strictly a night-day, not a day-night. The Hebrew language has the power of expressing a night and a day in conjunction; and the word which it uses for that purpose is *Áreb-bekour,* literally, *evening-morning:* in which form and which sense it occurs again, of the 2300 days of Daniel[1].

It is superfluous to observe that the same mode of speaking is employed in summing up the work or result of each of the succeeding days of the hexaëmeron, down to the first sabbatic *νυχθήμερον* itself. The first week then of noctidiurnal time, the first hebdomadal cycle which ever elapsed in connection with the present system of things, was made

[1] viii. 14.

up of seven actual cycles of night and day, reckoned according to this peculiar rule, from sunset to sunset. The law of this *first, de facto,* must determine that of every other. It could not be one and the same cycle, neither the noctidiurnal, nor the hebdomadal, which began in this way, and was reckoned in this way, at first, if it was ever after found to be going on in a different way, or to be reckoned in a different manner *.

* The earliest intimation of the primitive rule of the noctidiurnal reckoning, later than the account of the hexaëmeron, which occurs in the regular course of Scripture history, we apprehend to be Gen. xv. 12: "And when the sun was going down."—17, "And it came to pass that, when the sun went down and it was dark,"—in which the allusion to the close of the natural day is distinctly marked by the setting of the sun, and the coming on of darkness. Yet it is added, directly after, in verse 18, "In the same day the LORD made a covenant with Abraham." This *day* therefore was reckoned to be already current after sunset, and in the night. If so, it began at sunset.

The same inference may be drawn from Gen. xxiv. 11, 12, in the account of the mission of Abraham's servant to Padan-haran; "And he made his camels to kneel down.... by a well of water at the time of the evening.... And he said, O LORD,.. send me good speed this day." Cf. 42, "I came this day." And yet all this passed in the night time. See 23, 33, and 54, "tarried all night."

In like manner, in the account of what preceded the passage of the Red sea, though Exod. xiv. 15, 20, 21, 24, 27. will shew it must have happened after sunset, or evening tide; yet, xiv. 13, Moses says, "Which he shall shew you to day.—The Egyptians whom ye have seen to day." This day too then was reckoned from sunset or evening, and was current strictly in the night time itself.

The limits of the first νυχθήμερον or first day of that week, the last day of which was destined to be the first sabbath according to legal appointment and prescription, (the seventh day of the dispensation of manna,) seem as if purposely marked out agreeably to the primitive rule, Exod. xvi. 6, 7, "At even, then ye shall know.... And in the morning, then ye shall see;" that is, as an *evening-morning,* in the strictest sense of the term. Cf. 8, 12, 13.

Ezekiel xlvi. 1. "On the sabbath it shall be opened.. 2. But the gate shall not be shut till the evening:" implying that the sabbath would expire at even, not before. Cf. 12, 3, 4, 6, 11. Exod. xxii. 26, "Thou shalt deliver it unto him by that the sun goeth down;" that is, at the end of the civil day: cf. 27. Deuteron. xxiv. 13, 15.

Exod. xxvii. 21, "Shall order it from evening to morning;" which is meant of the sacred lamp, which was thus to be trimmed or prepared at evening, and from evening as such: cf. Exod. xxx. 7, 8: Levit. xxiv. 3.

SECTION II.—*On the noctidiurnal rule of the Jews.*

From the rule of Scripture we may pass to that of the Jews. The rule and observance of the Jews indeed in this respect is not to be distinguished from the rule of Scripture. It can never be proved that the Jewish mode of reckoning the noctidiurnal cycle is different at present from what it always was; or that either at present or formerly it is or was any thing different from that which was prescribed or sanctioned by the Law of Moses. For argument's sake however we may consider the requisitions of the Law in this particular as one thing, and the practice of the Jews themselves as possibly another.

Now according to the modern Jewish calendar, by which their new moons, their sabbaths, their feasts and observances of every kind are regulated, the reckoning of the noctidiurnal cycle proceeds from evening or sunset, to evening or sunset, perpetually; though for the sake of uniformity and of a common understanding on this point among all the Jews, wheresoever they are to be found, it is agreed to reckon evening or sunset from 6 p. m. of mean time, for the meridian of Jerusalem, for which their tables of mean lunar time are computed[m]. But in the times contemporary with the

The daily sacrifice of morning and evening too is counted as that of one day, Exod. xxix. 38. cf. 39. 41.—Levit. xxii. 7, "And when the sun is down, he shall be clean;" that is, at the end of the day: cf. 6. and many similar intimations of the legal term of legal uncleanness, as confined to *one* day, and that day as expiring at sunset: Leviticus xi: Numb. xix. all through: Deuteron. xxiii. 11.

In like manner, the fasting of the men of Jabesh-Gilead: "Fasted until even:" 2 Sam. i. 12; that is, for *one* day—till the end of that one day. Also David's fasting, 2 Sam. iii. 35: "To eat meat while it was yet day.. .. If I taste bread, or ought else, till the sun be down."

The Scripture rule from first to last is illustrated by these passages, and shewn to be one and the same. As we have observed however, there is little necessity to prove so clear a point, and one so generally admitted: though, as to any connection of the particular rule of Scripture with any thing else, such as the universal rule of mankind in the same respect, at first, (of which it explains the origin, while it attests the fact,) divines, and commentators, and chronologers hitherto have not so much as suspected it.

[m] Maimonides, De Ratione intercalandi, cap. v: cap. xi. § xvii: cap. xviii. § xii.

Christian æra, it was reckoned according to the variable phenomena of the actual evening; sometimes earlier, sometimes later, than 6 p. m. according to the season of the year.

Josephus informs us that in his own time, and before the destruction of Jerusalem, both the beginning and the ending of every Sabbath were notified by the sound of a trumpet, and each at sunset; a priest being stationed on one of the pastophoria, arcades or colonnades, of the Temple, which commanded a view of the setting sun, on purpose to make known each at the proper time: *Ἔνθα τῶν ἱερέων εἷς ἐξ ἔθους ἱστάμενος ἑκάστην ἑβδομάδα εἰσιοῦσαν προεσήμαινε σάλπιγγι δείλης, καὶ τελεσθεῖσαν αὖθις περὶ ἑσπέραν, ὅτε μὲν ἀνεργεῖν τῷ λαῷ καταγγέλλων, ὅτε δὲ ἔργων ἔχεσθαι* [n].

It could not be peculiar to the Sabbath at this time to be reckoned in this manner from sunset to sunset, and not to every day of the week before and after it also. Whatsoever establishes the rule of the sabbatic *νυχθήμερον* among the Jews, establishes that of the whole hebdomadal cycle. Now the sabbath in particular was so reckoned even in the time of Nehemiah; only that he designates its proper commencement (the moment of sunset) by the time when it began to be dark [o]; just as in another instance he defines the natural day by the interval from morning till the close of twilight, "when the stars appeared [p]."

There are many passages in the Gospels however, which prove that the rest of the Sabbath did strictly expire, and the cycle of days, on which it was lawful to do any manner of work, in our Saviour's time did strictly begin at sunset [q]. It is implied in the limits assigned to the *παρασκευὴ*, or preparation of the sabbath; i. e. from the ninth hour of the sixth day of the week to sunset; in which Josephus [r] and the Gospel historians [s] are agreed.

And that we may not suppose this rule was confined to Judæa, or to the seventh day of the week; there is a clear instance in the Acts of the Apostles of the same kind of reckoning in the case of the first day of the week; when

n De Bello, iv. ix. 12. (Oberthüri.)

o xiii. 15–22.

p iv. 21.

q Matt. viii. 16: Mark i. 21. 32: Luke iv. 31. 38. 40: Mark xvi. 1, 2: Luke xxiii. 56.

r Ant. Jud. xvi. vi. 2.

s Mark xv. 33. 42: Luke xxiii. 44. 54: John xix. 31. 42: Matt. xxvii. 62.

St. Paul and St. Luke were at Troas in Asia Minor[t]. The most exact calculation of the time, both before and after that preaching at Troas, renders it demonstratively certain that the first day of the week there alluded to was reckoned from the evening of the seventh: i. e. as we should say, though intended of Sunday, it was dated from sunset on Saturday[v] *.

* The Jewish rule of the reckoning of the noctidiurnal cycle is illustrated by 2 Esdras, x. 58: "But to-morrow, at night, thou shalt remain here:" compared with x. 59: "So I slept that night and another, like as he commanded me:" which shews that the morrow in question was understood to be reckoned from the next night but one.

This is the same idiomatic mode of speaking as that which appears in the Gospels: *Σήμερον ἐν τῇ νυκτὶ ταύτῃ*[w]—*'Ετέχθη ὑμῖν σήμερον σωτήρ*[x]: yet, just before, *φυλάσσοντες φυλακὰς τῆς νυκτός*[y]: from which last it is to be collected that this appearance of the angels took place at night; consequently that the day alluded to by them was reckoned from night. The same rule of reckoning appears in the book of Tobit: "Until the going down of the sun[z]:" "And after the going down of the sun[a]:" compared with verse 1, which shews that this was passing on the day of Pentecost, (a sabbath by appointment, on whatsoever day of the week it might fall[b],) and that the rest of this sabbath was considered to expire at sunset. Also by the song of the three children, in the book of Baruch: "O ye nights and days, bless ye the Lord[c]!" in which apostrophe, the night precedes the day, as in the similar idiom of the Greeks, of which more will be said by and by.

Of the courses and ministration of the Priests and Levites, according to the appointment of David, Josephus observes[d]: *Διέταξε δὲ πᾶσι τοῖς ἐκ τῆς Λευϊτίδος φυλῆς καὶ τοῖς ἱερεῦσι δουλεύειν νύκτα καὶ ἡμέραν τῷ Θεῷ, καθὼς αὐτοῖς ἐπέστειλε Μωϋσῆς.* Cf. Ps. cxxxiv. 2. Philo Judæus[e]: *Οἱ δ' ἐν κύκλῳ περινοστοῦσιν ἐν μέρει διακληρωσάμενοι νύκτα καὶ ἡμέραν, ἡμεροφύλακες καὶ νυκτοφύλακες.*—Hecatæus of Abdera[f]: *'Επὶ τούτων φῶς ἐστιν ἀναπόσβεστον καὶ τὰς νύκτας καὶ τὰς ἡμέρας—Διατρίβουσι δ' ἐν αὐτῷ καὶ τὰς νύκτας καὶ τὰς ἡμέρας ἱερεῖς*[g].

Δεκάτῃ δὲ τοῦ αὐτοῦ μηνὸς κατὰ σελήνην διανηστεύονται ἕως ἑσπέρας[h]: implying that the tenth of Tisri ended at even.—*Οἱ καλούμενοι 'Ιουδαῖοι... ἀργεῖν εἰθισμένοι δι' ἑβδόμης ἡμέρας...ἀλλ' ἐν τοῖς ἱεροῖς ἐκτεταχότες τὰς*

[t] Acts xx. 7.

[v] See our Dissertations on the Principles and Arrangement of an Harmony of the Gospels, Oxford, 1837, App. Diss. xxv. vol. iv. 516–524: Prolegomena ad Harmoniam Evangelicam, Oxonii, 1840, cap. iv. 268, 269.

[w] Mark xiv. 30.

[x] Luke ii. 11. [y] Luke ii. 8.

[z] ii. 4. [a] ii. 7.

[b] Cf Josephus, Ant. Jud. xiii. viii. 4.

[c] i. 47.

[d] Ant. Jud. vii. xiv. 7.

[e] Opp. ii. 236. 33. De Præmiis sacerdotum.

[f] Joseph. contra Apion. I. 22. 1188–1190.

[g] Cf. Eusebius Præp. Evang. ix. 4. 351. 2: 352. 6. (Gaisfordii, Oxon. 1843.)

[h] Ant. Jud. iii. x. 3. cf. 2.

SECTION III.—*On the Egyptian rule.*

Among the testimonies quoted above, those of Varro, Aulus Gellius, and Censorinus, make no mention of the Egyptian rule: those of Pliny, and Servius, and Lydus, and Isidore, and Bede, and the Auctor Anonymus, do so. But among these themselves, that of Pliny represents it differently from those of the rest; as if the night-day of the Egyptians were reckoned from midnight to midnight, and not from sunset to sunset.

With respect to this question then, the weight of numbers would seem to be on one side; that of antiquity and of authority on the other. We shall therefore consider it open to doubt what the true nature of the noctidiurnal rule among the Egyptians must have been; and without referring to any authority yet produced, we will endeavour to shew, from incontestible matters of fact, that the Egyptian rule agreed with the primitive; that is, with the rule of Scripture and with the rule of the Jews; that the civil day was always

χεῖρας εὔχεσθαι μέχρι τῆς ἑσπέρας[i]: which shews that the Sabbath among the Jews notoriously lasted until evening. Μεταπέμπεσθαι γὰρ τὴν ἐμὴν δύναμιν διὰ τὸ λήγειν ἤδη τὴν ἐνεστῶσαν ἡμέραν οὐκ ἐδοκίμαζον[k]. This is spoken of the sixth day of the week. It proves therefore that the Sabbath was reckoned to set in on the evening of this sixth day: Οὐδὲ γὰρ ἀφικομένης αὐτῆς εἰς τὴν ἐπιοῦσαν ὅπλα λαβεῖν, κωλυόντων ἡμᾶς τῶν νόμων[k].

Ἄρχεται γὰρ ὁ σαββατισμὸς Ἰουδαίοις καὶ πᾶσα ἑορτὴ νόμιμος ἀφ᾽ ἑσπέρας[l]—Πολλοὶ μάρτυρές εἰσιν τῆς τοῦ σωτῆρος ἀναστάσεως· νὺξ μὲν καὶ πανσέληνον φῶς· ἑκκαιδεκάτη γὰρ ἡ νὺξ ἦν[m]. This sixteenth day therefore was reckoned from sunset or nightfall.

Πῶς νοητέον τὴν τοῦ Κυρίου τριήμερον ταφὴν καὶ ἀνάστασιν[n]; Ἀπόκρισις Σεβήρου Ἀντιοχέως· Ἑκάστην ἡμέραν ἀφ᾽ ἑσπέρας ἀριθμεῖν εἰώθαμεν, καὶ μετὰ τῆς προλαβούσης νυκτὸς εἰς ἓν συνάπτειν . . . καὶ δηλοῦσιν Ἰουδαῖοι μέχρι καὶ τήμερον τοῦτο φυλάττοντες, καὶ οὐ τὴν μετὰ τὸ σάββατον (νύκτα) ἀλλὰ τὴν πρὸ τοῦ σαββάτου νύκτα τῇ ἀργίᾳ καὶ τῇ σχολῇ τιμῶντες. καὶ ἡμεῖς δὲ τὴν κατὰ τὴν κυριακὴν ἡμέραν τὴν προλαβοῦσαν (lege τὴν καὶ τὴν κυριακὴν ἡμέραν προλαβοῦσαν) νύκτα τιμῶμεν, ὡς τῇ ἡμέρᾳ τῇ μιᾷ (the first day of the week) συναπτομένην, καὶ οὐ τὴν ἐφεξῆς νύκτα. ἕκαστον γὰρ νυχθήμερον ἓν ὡς ἄν τις εἴπῃ σῶμά ἐστι.

[i] Contra Apion. i. 22. p. 1192.

[k] Joseph. Vita, 32.

[l] SS. Deperdit. Vaticana collectio, i. 188. D. Apollinarius of Laodicea, in Lucam.

[m] Cyrillus Hierosolym. Catechesis xiv. xii. ad princip. Opera (Milles) Oxonii, 1703.

[n] Anastasius Sinaïta, Quæstiones et Resp. clii. p. 613, 614. (Gretseri, Ingolstadii, 1617.)

reckoned in Egypt from sunset to sunset, and never, so far as is known, in any other way; certainly not in that in which it is asserted by Pliny to have been reckoned, viz. from midnight to midnight.

1st then, Wheresoever it appears to have been recognised as a *principle* that *darkness* was older than light; there, we may take it for granted, in the natural order of light and dark, and therefore in the natural reckoning of day and night, the night would be considered to precede the day: the civil day, according to the order of nature, would be reckoned from evening to evening, not from morning to morning; much less from midnight to midnight.

Now this *principle* was recognised in Egypt. We are told at least by Ælian [o], that one of the symbols or marks of the Apis carried *this* notion along with it, and was understood to be symbolical of it: and Plutarch assigns it as a reason why the shrew mouse (though blind, or supposed to be blind) was esteemed sacred in Egypt, that darkness was considered by them an older state of being than light: Τὴν μὲν γὰρ μυγαλῆν ἐκτεθειάσθαι λέγουσιν ὑπ' Αἰγυπτίων, τυφλὴν οὖσαν, ὅτι τὸ σκότος τοῦ φωτὸς ἡγοῦντο πρεσβύτερον· τίκτεσθαι δ' αὐτὴν ἐκ μυῶν πέμπτῃ γενεᾷ, νουμηνίας οὔσης [p].

ii. In Juvenal's description of the scene, which passed in his own time, in Upper Egypt, between the people of Tentyra and those of Ombos, it is clearly supposed to be the common rule of such orgies, to begin at evening and to last until morning; and sometimes for a series of evenings and mornings:—

.... Ne
Lætum hilaremque diem, ne magnæ gaudia cœnæ
Sentirent, positis ad templa et compita mensis,
Pervigilique toro; quem *nocte ac luce* jacentem
Septimus interdum sol invenit.—xv. 40.

iii. We are informed by Plutarch [q], that the last five days of the Egyptian year (the five epagomenæ of the equable year) were reputed among the Egyptians the birthdays of five of their principal divinities; the first of Osiris; the second of Arueris, (Apollo, or Horus the elder;) the third of

[o] De Natura Animalium, xi. 10.

[p] Symposiaca, iv. Problema v. 2. Cf. sir Gardiner Wilkinson's "Manners and Customs," second series, ii. ch. xiv. 133—136.

[q] De Iside et Osiride, xii.

Typhon; the fourth of Isis; the fifth of Nephthys, Teleute, Aphrodite, or Nike.

Now Typhon in particular, in the apprehension of the Egyptians, being the personification of the principle of evil; his birthday was naturally regarded as an *ἡμέρα ἀποφράς*: for which reason, says Plutarch, the kings of Egypt would transact no public business, nor even attend to the care of their own persons, on that day, *μέχρι νυκτός*: *καὶ τὴν τρίτην τῶν ἐπαγομένων ἀποφράδα νομίζοντες οἱ βασιλεῖς οὐκ ἐχρημάτιζον, οὐδὲ ἐθεράπευον ἑαυτοὺς, μέχρι νυκτός.* As the priests in Egypt represented the matter to the Greeks[r], every day, in the time of their ancient kings, had its cycle or round of duties and occupations, prescribed by law itself and even for the kings; each of which was to be attended to in its own order, and at its own time. Plutarch does not say *μέχρι μεσονυκτίου*, but *μέχρι νυκτός*; which means sunset, the beginning of night, in the popular sense every where. This distinction appears to us plainly to imply that, from as far back as the invention of this fable in Egypt, (which our modern Egyptologers, as they style themselves, consider one of the oldest among the Egyptians,) the third of the epagomenæ in particular was reckoned from evening to evening. But if the third epagomene began and ended at sunset, so did the second, and so did the fourth; and so must every 24 hours in the calendar, from the beginning to the end of the Egyptian year, have done.

iv. The common division of night into twelve hours beginning at sunset, and the similar division of day into twelve hours reckoned from sunrise, at all seasons of the year alike, was certainly in use in Egypt, before and after the time of Pliny*. And though this fact may not prove of *necessity*

* *Ἰσημερίας δύο πάλιν σημαίνοντες* (Αἰγύπτιοι) *κυνοκέφαλον καθήμενον ζωγραφοῦσι ζῶον· ἐν ταῖς δυσὶ γὰρ ἰσημερίαις τοῦ ἐνιαυτοῦ δωδεκάκις τῆς ἡμέρας καθ' ἑκάστην ὥραν οὐρεῖ. τὸ δὲ αὐτὸ καὶ ταῖς δυσὶ νυξὶ ποιεῖ . . . καὶ ὅτι ἐν ταῖς ἰσημερίαις μόνος τῶν ἄλλων ζώων δωδεκάκις τῆς ἡμέρας κράζει, καθ' ἑκάστην ὥραν*[s].

We may observe that on the monuments, and in the sculptures of Egypt, (to which, whether rightly or wrongly, so great an importance is

[r] *Διατεταγμέναι δ' ἦσαν αἵτε τῆς ἡμέρας καὶ τῆς νυκτὸς ὧραι, καθ' ἃς ἐκ παντὸς τρόπου καθῆκε τὸν βασιλέα πράττειν τὸ συντεταγμένον ἐκ τῶν νόμων.* Diodorus Sic. i. 70.

[s] Horapollo, i. 16. (De Pauw, 1727.)

that the civil day in that country must have been reckoned from sunset; it must do much towards proving it. And we may observe on this rule in general that, wheresoever it held good, whatsoever the *legal* or *civil* rule of reckoning the day and night might be, common consent, the custom of the country, the vulgar or popular practice, had established a rule of its own; whereby *day*, in the ordinary sense of the term, was supposed to begin at sunrise perpetually, and *night*, in the same acceptation, at sunset.

The Scholia on Aratus (the work of an Egyptian commentator) would supply a multitude of examples of this popular Egyptian rule of the noctidiurnal cycle. We will mention only one; which every one however must admit to be directly to the point: Καὶ ἡ τοῦ κυνὸς ἐπιτολὴ κατὰ ἑνδεκάτην ὥραν φαίνεται[x]. Ἐπιτολὴ has here its precise astronomical sense of the first appearance of a star in the morning twilight. The eleventh hour spoken of therefore must have coincided with the beginning of morning twilight; or nearly so. It is consequently the eleventh hour of night—an hour of nocturnal time before sunrise: the end of the eleventh

attached at present,) the hours of night and of day are both found to be similarly represented, 12 of each, 24 both together.

We may remark also that, according to sir Gardiner Wilkinson[s], the third person of the triad of Denderah was the Egyptian god of day, Ehôou, represented as the son of Athor, by whom he was nursed and brought up. Now Athor was the Egyptian personification of night[t]: and after pointing out the resemblance between this Egyptian name of Ehôou and the Greek ἠὼς[u], which in that language also is the name of the morning, sir Gardiner himself observes: "It may then be supposed that he (Ehôou) represents the day; and he is with justice considered the child of Athor or night, *from which every new day was supposed to spring.*"

The Italics here are our own. We wish to draw the attention of the reader to this testimony of sir G. Wilkinson's, That among the Egyptians every day was supposed to be born of the preceding night.

As to the personification of day under the name of Ehôou, though sir G. Wilkinson has not drawn any such inference from it, we have no hesitation in inferring that it is nothing more or less than the Greek ἠὼς itself, (or ἕως, unde ἑῷος) transferred to the Egyptian Pantheon from the Grecian. But this is another question.

[s] Manners and Customs, second series, i. ch. xiii. 409—411.

[t] Cf. 386—394.

[u] P. 411.

[x] Ad Phænomena, 152.

and the beginning of the twelfth hour of night. And the night being thus divided, the day must have been so too.

v. Speaking of the summer solstice observed by Meton and Euctemon at Athens, B. C. 432, Ptolemy observes[y]: Ἐκείνη μὲν γὰρ ἀναγράφεται γεγενημένη ἐπὶ Ἀψεύδους ἄρχοντος Ἀθήνησι, κατ' Αἰγυπτίους Φαμενὼθ κα' πρωΐας. In a subsequent allusion to it he remarks[z]: Ἐὰν ἡ ὑπὸ τῶν περὶ Εὐκτήμονα τετηρημένη θερινὴ τροπὴ περὶ τὴν ἀρχὴν τῆς τοῦ Φαμενὼθ κα' ᾖ γεγενημένη. These two passages prove that by περὶ τὴν ἀρχὴν and by πρωΐας the same time of the same day in each instance is meant; and as the latter denotes some time between daybreak and sunrise, the former must do the same: in which case the 21st of Phamenoth, the day meant in each instance, might have been reckoned from sunrise, but could not have been from midnight. Πρωῒ is the moment of sunrise; πρωΐα is the interval between daybreak and sunrise[a]. The day then, which is here to be understood, the day as such, began at πρωῒ or sunrise[b]. But the day as such would be only one half of what must have been denoted by this date in the complex: and if this half (the *day*) began at sunrise, where or when could the other (the night) begin, except at sunset?

vi. It may be proved from Ptolemy himself that, though in his Magna Compositio, and in his other works, he adopted for his own use a different rule of the noctidiurnal reckoning; the vulgar Egyptian rule was such as we are contending it was, from evening to morning, and morning to evening, from sunset to sunrise, and sunrise to sunset: certainly not from midnight to midnight, or from noon to noon.

It is the rule of Ptolemy to reckon his dates from the first of Thoth *at noon*[c]: but there is an idiom of regular occurrence in the Magna Compositio, according to which the dates so reckoned are identified with others, just one number higher, yet supposed to be equivalent to them. The form, in

[y] Magna Compositio, iii. ii. 162.

[z] Ibid. p. 163.

[a] Cf. our Dissertations, vol. iii. 215. 217. 283. iv. 511.

[b] Cf. our Dissertations, iv. 108. Appendix, xviii., and the epigram there quoted from the statue of Memnon in Egypt; according to which the 24th Athyr, in the Egyptian style, began at the first hour, and the first hour began at sunrise.

[c] Cf. iv. Ὑποθέσεις τῶν πλανωμένων, 46, 47: 49: 51–53, 54: 56: Ἀρχαὶ or Epochs, 59. Cf. vi. Πρόχειροι κανόνες. Prolegomena, ad finem, 2, 3, &c. p. 30, 31, 32.

which this idiomatic mode of enuntiating such dates runs in general, is as follows. If the date be Τυβὶ γ′[d], for instance, it will be expressed by κατ' Αἰγυπτίους Τυβὶ γ′ εἰς τὴν δ′.

The earliest example of this idiom, which occurs in the Compositio, is the date of the autumnal equinox, Period. Callipp. iii. 32. Epagomene γ′ εἰς τὴν τετάρτην[e]. The next is a date of the vernal equinox, Mecheir 29, μετὰ τὸ μεσονύκτιον τὸ εἰς τὴν λ′[f]: in which it is easy to see that the ellipsis must have been φέρον or προάγον: and such an ellipsis is found actually supplied in another date of the same kind, that of the third Epagomene, τοῦ μεσονυκτίου τοῦ εἰς τὴν δ′ φέροντος[g]: though, if we are not mistaken, often as the phrase itself occurs, this is the only instance of the entire date fully expressed.

This regular qualification of his dates intimates that they are proposed by Ptolemy as *proleptic*. But proleptic of what? The dates so qualified are in every instance his own; those which he refers himself to the fixed epoch of noon. If so, these qualified dates can be understood of nothing referred to noon, *earlier* at least than noon, and in the course of one and the same 24 hours reckoned back from noon. They cannot anticipate on sunrise or sunset in comparison of noon, thus reckoned back from noon. They must anticipate, if at all, on some point in the course of 24 hours, later than noon; that is, either sunrise, or midnight, or sunset next after the the point of noon. Now many of them fall later than sunrise; therefore they cannot uniformly anticipate on dates reckoned from sunrise. Many, again, fall later than midnight: and therefore they cannot always anticipate on dates reckoned from midnight. On what then can they anticipate, and to what must this qualification be referred perpetually, but the point of sunset?

The true explanation of this mode of speaking and of all these double dates appears to us to be supplied by the following passage of Ptolemy's own commentator, Theo; who also adopts this idiom, such as it was: Τὴν δὲ ἀπὸ μεσημβρίας ὥραν ληψόμεθα, ἑβδόμην ἡμερινὴν ὥραν πρώτην καλοῦντες, καὶ τὴν

[d] As iv. viii. 267, 268.
[e] Lib. iii. cap. ii. 153, cf. 160, 161.
[f] Ibid. 154, cf. 157.
[g] Ibid. 160, 161.

ὀγδόην δευτέραν, καὶ ἑξῆς ὁμοίως, μέχρι τῆς εἰκοστῆς-τετάρτης, ἥτις ἐστὶ τῆς ἑξῆς ἡμέρας ὥρα ἕκτη[h].

On this principle the seventh hour of one of Theo's or Ptolemy's days, reckoned from noon, would be the first hour of a corresponding day, reckoned from sunset. We see then that the beginning of one of the former must anticipate *six* hours on that of one of the latter. If then the popular rule reckoned the day from evening to evening, and that of Theo or Ptolemy from noon to noon, perpetually; we perceive a reason at once why one of their dates, as conformed to this latter rule, should be represented as anticipating on one of the popular, reckoned by the popular rule; or rather, why it could not even be proposed in conjunction with the corresponding popular date, except as anticipating in this manner upon it.

It confirms this explanation that among the many instances of such dates, which occur in the Compositio, not one is to be met with which turns out on examination to fall between noon, the proper epoch of Ptolemy's reckoning of the noctidiurnal cycle, and sunset, that of the popular. This was the only case, to which any such qualification of his own dates, according to their proper rule, as this of anticipating on the same days of the month according to the popular rule, was not applicable. The qualification occurs probably sixty times, or oftener, in the Almagest: and each case of the kind has passed repeatedly under our observation: yet not one of them, so far as we have been able to discover, comes within the limits in question; that is, between noon and sunset on the same day.

It is discoverable in dates which fall exactly at sunset; at evening or ἑσπέρας: that is, just where the sixth hour of one of Ptolemy's night-days ends, and the first of one of the popular reckoning begins; but not so in dates earlier than sunset or evening. There is a date of this description, Epiphi 18, μετὰ δ' ὥρας τῆς μεσημβρίας[i], which wants the qualification: another, Mesore 24, κατ' αὐτὴν τὴν ἐν τῇ κδ' μεσημβρίαν[k]: a third, Paüni 17, μετὰ γ' καὶ γ'' ὥρας καιρικὰς (Paüni 17, 3h. 20m.) from noon[l]: a fourth, Athyr 13, μετὰ

[h] Opp. vi. Πρόχειροι κανόνες, 31.
[i] Lib. xi. v. 268.
[k] Ibid.
[l] Lib. v. v. 304.

ε′ ϛ″ γ″ (5h. 50m.) ὥρας ἰσημερινὰς τῆς μεσημβρίας[m]: all which fall critically as we have represented the state of the case to be, viz. between noon and sunset, and all want the qualification in question; evidently because it was not applicable to them.

There are instances however in which Ptolemy himself uses the popular mode of reckoning the day, and the hours of the day. One such is the date already considered, of the solstice of Meton and Euctemon, Phamenoth 21 πρωΐας: especially as it turns out that the point of time actually intended was June 27 cir. 5 a. m.: which, according to his own idiom, would have been expressed by Phamenoth κ′ τῇ εἰς τὴν κα′, at 17 hours or πρωΐας. In like manner, the date of an observation in the second year of Antoninus (Pius) Phamenoth 25, μετὰ μὲν τὴν ἀνατολὴν τὴν τοῦ ἡλίου, πρὸ ε′ δὲ καὶ δ′ ὡρῶν ἰσημερινῶν τῆς μεσημβρίας[n] is in the popular style: though it appears directly after that according to his own rule it was Phamenoth 24, at 18h. 45m. from noon. So again, in the next date[o], Epiphi 16, τοῦ διμοίρου τῆς πρώτης ὥρας παρεληλυθότος; i. e. as it is further explained, 6h. 30m. πρὸ...τῆς ἐν τῇ ις′ μεσημβρίας: the actual date, according to his own rule, being Epiphi 15, at 17h. 45m. from noon. In like manner, the 19th Thoth, ὄρθρου[p]: which was just before expressed by Θὼθ ιη′ εἰς τὴν ιθ′. It is unnecessary however to multiply examples of this kind. We will observe further only that the same rule of reckoning and the same idiomatic mode of designating his dates would seem to be attributed by Ptolemy to Timocharis also: Κατ' Αἰγυπτίους Μεσορὶ ιζ′ εἰς τὴν ιη′: and again, τῇ κα′ τοῦ Μεσορὶ εἰς τὴν κβ′, ἐξ ὧν φησιν ὁ Τιμόχαρις[q]: unless it should rather be supposed he himself in this instance reduced Timocharis' actual date to his own rule *.

* Yet this idiom of Ptolemy certainly appears in dates produced by the Abbé Halma from MSS. of the National library at Paris, A. D. 497–498. A. D. 502–503, and A. D. 508–509[r]. It appears too in very many instances, in the dates of Vettius Valens, an unedited writer on judicial astrology, of whom we may have occasion to give some account hereafter. It has been commonly supposed that this author was a

m Lib. v. xiii. 332.
n Lib. v. iii. 293, 294.
o Ibid. 295.
p Lib. ix. x. 187.
q Lib. x. iv. 205.
r Opp. iii. Canon of Ptolemy, p. 10–11. (MS. 2390, p. 7.)

It remains then to explain, if possible, the statement of Pliny, that the Egyptians reckoned the noctidiurnal cycle from midnight.

We are of opinion that without being altogether mistaken this statement involves an inaccuracy, which was probably due to some confusion made by Pliny, in his own apprehension of these two things, between the rule of Hipparchus in particular and that of the Egyptians in general: and it is observable, that he mentions both together, and evidently considered them the same. This confusion would be accounted for, if many of the observations of Hipparchus were made in Egypt, and dated in terms of the Egyptian calendar; and if Pliny was aware of that fact: and if the rule of Hipparchus himself was to reckon from midnight. The first of these suppositions is attested by the Magna Compositio. The second may very well be taken for granted. The third, (which is the most important of all,) may be rendered probable, if not certain, as follows.

i. The rule of reckoning the noctidiurnal cycle, or period of 24 hours, from noon has always been most characteristic of the astronomers. This we have seen is certainly Ptolemy's rule: but whether he was the first among the astronomers of antiquity to introduce the rule, is more than we can undertake to say; at least from any thing which appears in his own works. We are entirely of opinion, that traced up to its origin this peculiar rule will be found to have been first introduced by the ancient Egyptians, long before the time of Ptolemy; but *when*, and in connection with *what* else, it would be premature to attempt to explain at present. Ptolemy recognised only the rule of reckoning it from evening or from noon in the definition produced supra[s]; but where he is speaking of the reduction of kairic or variable hours to uniform or mean in the shape of equinoctial[t], he alludes to this of reckoning it from midnight: Ἵνα οὖν καὶ

contemporary of Adrian's. But he uses the æra of Diocletian, and he has dates of the reign of Valentinian. So far consequently the continuance of the popular rule of the noctidiurnal cycle in Egypt, in contradistinction to the astronomical, would be authenticated down to the sixth century.

[s] Diss. iv. ch. i. sect. iii. p. 137. [t] Magna Compositio, lib. iii. viii. 209.

τὰ καθ' ὁποίαν δήποτε διάστασιν διδόμενα νυχθήμερα (λέγω δὲ τὰ ἀπὸ μεσημβρίας ἢ μεσονυκτίου ἐπὶ μεσημβρίαν ἢ μεσονύκτιον) εἰς ὁμαλὰ νυχθήμερα καθάπαξ ἀναλύωμεν. And here he appears to recognize no mode of the reckoning in question absolutely but one of these two, from noon to noon, or from midnight to midnight; from which we may very probably infer that, while the former was his own, the latter, as the only one which he thought proper to specify along with yet as distinct from his own, was that of Hipparchus.

ii. Dates are recorded in the Compositio after Hipparchus, some of which are actually reckoned from midnight. For example the date of the autumnal equinox, Callippic Period iii. 36: on the fourth epagomene ἑσπέρας, δέον τοῦ μεσονυκτίου[u]. By the common rule this must have been expressed on the fifth epagomene, ἑσπέρας. The date of this equinox was actually Sept. 26, at 6 p. m. B. C. 143: answering to Nabon. 605 exeunte, and to epagomene 4 at 6 hours from noon, or at 18 hours from midnight, but to epagomene 5 at 0h. 0m. by the common rule[x].*

* It appears to us that when Hipparchus set himself to observe that series of autumnal and vernal equinoxes, of which Ptolemy gives the account (lib. iii. cap. ii. p. 153—155,) extending from the seventeenth year to the fiftieth of the third Callippic period; he determined on reckoning his νυχθήμερον, or period of twenty-four hours, from midnight; and neither from noon nor from sunset; though the latter in particular, as he very well knew, was the common mode of reckoning it, especially in Egypt, where he himself must have been at this time. For all these observations were made at Alexandria, and the instrument used in making them was the armillary sphere, or brasen circle, as Ptolemy calls it, set up in what he designates by the name of the στοὰ τετράγωνος, the square court or quadrangle there: see p. 153, 154, and 155.

The object of these observations was to resolve the problem whether the excess of the natural or tropical year, over the equable year of 365 days, was six hours of mean solar time exactly or not; in other words, whether the mean natural year itself was exactly the same as the mean Julian, or less than it; for the solution of the former problem it is evident was that of the latter also.

Now it appears clearly from the testimony of Ptolemy that the first of these observations was made Mesore 30, περὶ τὴν δύσιν τοῦ ἡλίου: Call. Per. iii. 17: an autumnal equinox, (lib. iii. ii. p. 153.) This date was taken from Hipparchus; and this alone, in our opinion, serves to prove the point for which we are contending; viz. that he must have reckoned

[u] Lib. iii. ii. 153, 154. [x] Cf. Lib. vi. v. p. 390.

SECTION IV.—*On the Abyssinian rule, or ancient Ethiopic rule.*

The Egyptian rule of the reckoning of the noctidiurnal cycle may be illustrated, and to a certain extent confirmed

his night-day from midnight. For Mesore 30 at sunset, according to the common rule, must have been Epagomene 1 *ineunte*, or at sunset too. And that this date is to be understood critically of Mesore 30 at sunset, appears from the next observation, three years after; in the 20th year of the same third Callippic period. In three years, at the rate of six hours of mean time every year, the equinox ought to have been found eighteen hours in advance of its equable date in the 17th year: i. e. its date, Per. iii. 17, being Mesore 30 at sunset, its date, Per. iii. 20, ought to have been Epagomene 1 at noon. Its actual date, according to Hipparchus as reported by Ptolemy, was what he calls the *νεομηνία*, (meaning the first,) *τῶν ἐπαγομένων, πρωΐας*; that is, Epagomene 1 at sunrise, 12 hours only, instead of 18, later than its date in the former instance: which Hipparchus described as an anticipation of a quarter of a day. This proves demonstratively that Mesore 30 *περὶ τὴν δύσιν τοῦ ἡλίου*, the date before, is to be understood of Mesore 30 at sunset exactly; which, as we have already observed, must have been reckoned Epagomene 1 *ineunte* according to the common rule.

It is unnecessary to consider each of these observations in detail at present; though each of them is found to confirm more or less the same conclusion, respecting the epoch of the noctidiurnal cycle according to which they must have been reckoned. We will notice only one more; the date of the vernal equinox, Per. Call. iii. 43. (p. 154.) eleven years after the first of this series of vernal equinoxes in general, Per. iii. 32. The date of this first was Mecheir 27 *πρωΐας*, that is, Mecheir 27 at 6 hours from midnight. In eleven years, at the rate of 6 hours every year, the *ἐπουσία*, as Hipparchus calls it, or excess of the mean natural year, (supposed to be equal to the mean Julian,) over the equable, would amount to 66 hours, or 2 days 18 hours. The equinox therefore, Per. iii. 43, on this principle, should have been found falling exactly at midnight, Mecheir 30, if it was falling exactly at sunrise (the sixth hour or *πρωΐας*) Mecheir 27, Per. iii. 32. Hipparchus affirmed that such was the case. *Μετὰ δὲ ιά ἔτη, τῷ τεσσαρακοστῷ καὶ τρίτῳ ἔτει, τοῦ Μεχὶρ τῇ κθ′ μετὰ τὸ μεσονύκτιον τὸ εἰς τὴν λ′ γενέσθαι φησὶ τὴν ἐαρινὴν ἰσημερίαν, ὅπερ καὶ ἀκόλουθον ἦν τῇ ἐν τῷ λβ′ ἔτει τηρήσει.* It could not have been consistent with the former, unless that had taken place exactly at sunrise, or the sixth hour; and this exactly at midnight. *Πρωΐα* may denote a time coincident with sunrise, or a time a little before sunrise; but it could never denote a time later than sunrise. And since Hipparchus expressly states that this equinox happened *on* the 29 Mecheir, yet *μετὰ τὸ μεσονύκτιον τὸ* (*προάγον* or *φέρον*) *εἰς τὴν λ′*, what can we infer from this distinction except that he

by that of Ethiopia; between which country and Egypt there was always a close connection, and a great similitude of customs and rules of life. Not that the rule in either of these cases was derived from that in the other; but as the ancient Ethiopia and the ancient Egypt were contiguous regions, and peopled by a similar race of mankind, and as the political relations of these two countries were often so intermingled that Egypt itself was frequently subject to the kings of Ethiopia, and probably Ethiopia in its turn, (though that is not so well known a fact,) was sometimes in subjection to the kings of Egypt; there could not be much difference between the ordinary reckoning of time in either, and the same thing in the other.

With regard to the ancient noctidiurnal rule of Ethiopia; from what Herodotus tells us of the table of the sun among the Ethiopians of the time of Cambyses, whom he surnames Longlived, it is evident that they must have reckoned these days of the sun from evening: *Λειμών ἐστι ἐν τῷ προαστείῳ ἐπίπλεος κρεῶν ἑφθῶν πάντων τῶν τετραπόδων· ἐς τὸν τὰς μὲν νύκτας ἐπιτηδεύοντας τιθέναι τὰ κρέα... τὰς δὲ ἡμέρας δαίνυσθαι προσιόντα τὸν βουλόμενον*[y].

The modern Abyssinian rule however is the proper representative at present of the ancient Ethiopic one. The modern Abyssinian calendar, (as it will appear we trust in due time hereafter,) is regularly derivable from the ancient Ethiopic: and though it varies at present only slightly from the modern Egyptian or Coptic, and in such a manner as might almost escape a superficial comparison of the two together, still there is such a difference between them as proves that the Abyssinian was not borrowed from the Coptic, and that it has an origin and a parentage of its own, not derived from Egypt, but from the primitive calendar of ancient Ethiopia; which is in fact from the primitive calendar of all mankind.

reckoned the 29th critically to end, and the 30th critically to begin, at midnight? that he considered midnight a common term between Mecheir 29 and Mecheir 30, the *last* point before which belonged to the *former*, and the *first* point after it to the *latter?*

y iii. 18.

The Abyssinian rule at this very day is the same as this ancient one. It has descended through all changes of time unchanged itself. It is still the same as the ancient Egyptian; as the modern and the ancient Jewish; as the primitive rule of Scripture itself.

"Dies Ethiopicus," observes Scaliger [z], "ut et Judaïcus, incipit ineunte nocte: quæ in illis tractibus ingruit statim occaso sole, propter tropici longissimam ab horizonte distantiam. hoc tempus ipsi vocant *Meset* . . . . . matutinum tempus vocant *Nagge* . . . . hæc duo tempora constituunt τὸ νυχθήμερον quod Danieli dicitur Āreb-bekour: meridiem vocant *Kater*. neque aliam partitionem diei civilis norunt. nullus enim in illis partibus horologiorum usus."

Bruce's account of their mode of dividing the day and the night is to the same effect [a].

"They compute the time of the day in a very arbitrary irregular manner. The twilight, as I have before observed, is very short, almost imperceptible; and was still more so, when the court was removed farther to the southward in Shoa [b]. As soon as the sun falls below the horizon, night comes on, and all the stars appear. This term then, the twilight, they choose for the beginning of their day, and call it *Naggé;* which is the very time the twilight of the morning lasts. The same is observed at night; and *Meset* is meant to signify the instant of beginning the twilight, between the sun's falling below the horizon, and the stars appearing. Midday is by them called *Kater;* a very old word, which signifies *culmination,* or a thing's being arrived or placed at the middle or highest part of an arch. All the rest of times in conversation they describe by pointing at the place in the heavens where the sun then was, when what they are describing happened *."

* Cf. Murray's Life of Bruce, (1808, 4to.) App. No. xlvi. pt. ii. p. 398, where a somewhat different account is given of the same things.

"They divide the day into five parts (*humisi*). From the twilight, which is here short, it is *nagga:* about nine it is called *selest,* or the third hour: midday is *kutter:* three o'clock, *tessaat:* and sunset *serk.*"

z De Emendatione, vii. 702. A. B. (8vo. Dublin, 1791.)
a Vol. iii. book v. ch. xii. p. 684. b See p. 658.

This particular rule appears clearly in the Computus Ecclesiasticus of the Abyssinian church, explained by Scaliger[c]. The first *Matque,* that is, *new moon,* of their calendar is reckoned *in ortu noctis,* a prima (sc. luna): the tenth of this moon, (which the Abyssinian church observes as the Jews do the tenth of their Tisri,) is dated *in ortu noctis decimæ:* the *terminus phase,* or the vigil before Easter, is dated *in ortu noctis ab undecima:* and the *terminus jejunii salutaris, ineunte nocte in Nahasé,* (the name of the last month in their calendar,) *a vicesima septima.* These rules will be found explained by Scaliger[d], sufficiently to render them *intelligible.*

Section V.—*On the Hellenic or Grecian rule.*

i. *The Attic rule.*

No rule of the reckoning of the cycle of night and day is mentioned by any of our authorities as characteristic of the practice of the Greeks in general; only of that of the Athenians in particular. But it will be seen by and by, we hope, that there was no difference in reality between the Athenian rule in particular and the Grecian or Hellenic in general.

The Attic rule however is differently represented by them. According to some, the Athenians reckoned the cycle from sunset to sunset; according to others, from noon to noon. Were these different statements irreconcilable with each other, then, regard being had to the authors of each respectively, we should know which to believe in preference to which. But in reality they may not be inconsistent; they may be intended of the Attic rule at different times: of which question the proper time for the discussion would be when the Attic calendar itself was under consideration. At present we shall treat it as open to doubt what the Attic rule in particular or the Hellenic in general might have been; and as a question which is to be determined not by any of the statements produced above, but by a totally different kind of testimony not yet appealed to.

i. In the first place, according to the Greek Cosmogonia,

c De Emendatione, vii. 677. C. xxv.

d Ibid. 702. B. 703. A.

the antemundane, primordial, or elementary state of things was one of darkness; and the first act of the process, out of which resulted the *κόσμος*, the *διακόσμησις*, the existing order and beauty which we call the world, was the production of light. That there was a foundation in truth for this account; that Hellenic tradition in thus representing the beginning of things was but a correct echo of primitive belief, and a faithful testimony to the real order and course of things themselves, no one requires to be told who has read the Mosaic account of the creation, not in the spirit of pseudo-rationalism and pseudo-philosophy; i. e. not in the spirit of modern scepticism. On this principle it was that, according to Orpheus[e], the Demiurge himself, before he addressed himself to the work of creation, began by taking counsel with Night: *Μιμούμενος καὶ ταύτῃ τὸν τοῦ παντὸς ποιητὴν, ὃς πρὸ τῆς ὅλης δημιουργίας εἴς τε τὸ χρηστήριον εἰσιέναι λέγεται τῆς Νυκτὸς, κἀκεῖθεν πληροῦσθαι τῶν θείων νοήσεων, καὶ τὰς τῆς δημιουργίας ἀρχὰς ὑποδέχεσθαι . . . πρὸς μὲν τὴν Νύκτα πεποίηται τῷ θεολόγῳ* ('Ορφεῖ sc.) *λέγων,*

> *Μαῖα θεῶν ὑπάτη Νὺξ ἄμβροτε πῶς τάδε, φράζε,*
> *πῶς χρή μ' ἀθανάτων ἀρχὴν κρατερόφρονα θέσθαι;* κ'. τ. λ.

And as all mixture of distinct substances and of different natures, out of which the various forms of being which actually exist must be supposed to have sprung, was naturally to be attributed to love or desire; in the same spirit it was fabled that Love itself too was the first born of Night. *Ἀμφιβάλλουσι τίνος υἱὸν τὸν Ἔρωτα λεκτεόν. Ἡσίοδος μὲν γὰρ Χάους καὶ Γῆς , . . Ἀκουσίλαος Νυκτὸς καὶ Αἴθρης*[f].

> *Χάος ἦν καὶ Νὺξ Ἔρεβός τε μέλαν πρῶτον καὶ Τάρταρος εὐρύς·*
> *γῆ δ' οὐδ' ἀὴρ οὐδ' οὐρανὸς ἦν· Ἐρέβους δ' ἐν ἀπείροσι κόλποις*
> *τίκτει πρώτιστον ὑπηνέμιον Νὺξ ἡ μελανόπτερος ᾠόν·*
> *ἐξ οὗ περιτελλομέναις ὥραις ἔβλαστεν Ἔρως ὁ ποθεινὸς,*
> *στίλβων νῶτον πτερύγοιν χρυσαῖν, εἰκὼς ἀνεμώκεσι δίναις.*
>
> Aristophanis Aves, 693.

[e] Apud Proclum in Timæum, ii. (B) 148=64. E. Cf. Orphica, Fragm. x.

[f] Scholia in Theocritum. Cf. Hesiod, Theogonia, 116–122.

> *Ἀρχαίου μὲν πρῶτα χάους ἀτέκμαρτον ἀνάγκην,*
> *καὶ Κρόνον, ὡς ἐλόχευσεν· ἀπειρεσίοις ὑπὸ κόλποις*
> *Αἰθέρα καὶ διφυῆ πυρσωπέα κυδρὸν Ἔρωτα*
> *Νυκτὸς ἀειγνήτης υἷα κλυτόν· ὅν ῥα Φάνητα*
> *ὁπλότεροι κλήζουσι βροτοί· πρῶτος γὰρ ἐφάνθη.*
>
> Orpheus, Argonautica, 12.

The order of existence, according to Hesiod, was Chaos, Night, and Day.

Ἤτοι μὲν πρώτιστα Χάος γένετ', αὐτὰρ ἔπειτα
Γαῖ' εὐρύστερνος...
ἐκ Χάεος δ' Ἔρεβός τε μέλαινά τε Νὺξ ἐγένοντο,
Νυκτὸς δ' αὖτ' Αἰθήρ τε καὶ Ἡμέρη ἐξεγένοντο,
οὓς τέκε κυσσαμένη Ἐρέβει φιλότητι μιγεῖσα.
Theogonia, 116—125.[g]

So that, as Eustathius observes, day was the child of night: *Ἡσίοδος γοῦν τὴν μὲν ἡμέραν Νυκτὸς μητρὸς γενεαλογεῖ ἐν τῷ κ. τ. λ.*[h]

And such being the popular idea of the relation between night and day, each regarded as a person, there can be no question which would be commonly believed to be prior to the other; nor in what order the parts of the same *νυχθήμερον* must have been reckoned by those who entertained this opinion. Hence the allusions in the Greek poets to night, as the mother of day.

Εὐάγγελος γάρ, ὥσπερ ἡ παροιμία,
ἕως γένοιτο μητρὸς εὐφρόνης ἄπο.
Æschylus, Agamemnon, 264. (Dindorfii.)

Πόσου χρόνου δὲ καὶ πεπόρθηται πόλις;
τῆς νῦν τεκούσης φῶς τόδ' εὐφρόνης λέγω.
Ibid. 278.

Ὃν αἰόλα νὺξ ἐναριζομένα
τίκτει κατευνάζει τε, φλογιζόμενον
ἅλιον ἅλιον αἰτῶ. Soph. Trach. 94. (Dind.)

Κἀν τῷ Οἰδίποδι δὲ τῇ τραγῳδίᾳ τὴν νύκτα καὶ τὴν ἡμέραν εἴρηκεν αἰνιττόμενος[i]·

Εἰσὶ κασιγνηταὶ διτταί, ὧν ἡ μία τίκτει
τὴν ἑτέραν, αὐτὴ δὲ τεκοῦσ' ὑπὸ τῆσδε τεκνοῦται.

g Cf. Scholia, ad 115–116: Phornutus, De Natura Deorum, cap. 17. Opuscula Mythologica, p. 173, 174. (Gale, Amsteledæmi, 1688.)

Ante mare et terras et quod tegit omnia cœlum,
Unus erat toto naturæ vultus in orbe,
Quem dixere Chaos.
Ovid. Metam. i. 5.

Seu permixta Chaos rerum primordia quondam
Discrevit partu. Manilius, i. 125.

h Scholia ad Odyss. E. 121: I. 205. (=1527.) l. 56. Cf. the Cosmogonia ascribed to Orpheus, Scholia in Aristotelem, 828. 8a–15; In Metaphysica, 1091. l. 4–7.

i Athenæus, x. 75. De Theodecte Phaselita.

Hence also Hyginus[k]: Cum enim traditum sit nobis prius noctem quam diem fieri; noctem dicemus umbram terræ esse, eamque obstare lumini solis.—Diximus enim principium mundi esse noctem, deinde diem[l]. So likewise Servius[m]: Quod autem diximus, Dianam primo natam; rationis est: nam constat primo noctem fuisse cujus instrumentum est luna, id est Diana: post diem, quem sol efficit, qui est Apollo.

On the same principle we may explain the answer to the question, whether the night or the day was the older of the two, attributed to Thales[n]; Ἡ νὺξ, ἡμέρᾳ μίᾳ: the point of which resides entirely in this supposed relation and succession of the parts of the νυχθήμερον, in which the night took precedence of the day; and therefore the first night of the first day: for in this case it might truly be said night was older than day by one day. The same question is said to have been one of those which Alexander put to the Indian gymnosophists of his own time[o]; and the answer returned to it by the Indian philosopher to have been, That the day was the older by one day; in which there is no such antithesis as in the former case: though this also admits of being explained, if the rule of these Brahmins of Alexander's time was to reckon the noctidiurnal cycle from sunrise or morning, as it is of their brethren in India at this present day.

ii. In the allusions to the component parts of the νυχθήμερον which occur in Greek writers, it is observable that the idiomatic form of the allusion is invariably *night* and *day*, not *day* and *night*. We may infer from this fact that these two ideas were so associated in the minds of the Greeks, that they always presented themselves in *this* order; first night and then day. But how shall we account for the association itself, if the Greeks were not accustomed invariably to reckon the cycle of night and day in a corresponding order?

It is both curious and interesting to trace this idiom through Greek writings of all ages and on all subjects, beginning with Homer, for more than a thousand years. We shall exhibit some specimens of it in the text; and for more

k Astronomicῶν Poët. iv. 9.

l Ibid. 10.

m Ad Æneid. iii. 73.

n Diogenes Laërtius, i. cap. i. viii. § 35: Thales.

o Plutarch. Alexander, 64: Clemens Alex. Strom. vi. iv. § 38. p. 120. l. 17.

of the same kind (if any one wishes to see them) we shall refer to the notes.

Ἑπτὰ δὲ καὶ δέκα μέν σε ὁμῶς νύκτας τε καὶ ἦμαρ
κλαίομεν, ἀθάνατοί τε θεοὶ θνητοί τ' ἄνθρωποι.
Odyss. Ω. 63.

Αἳ δή τοι νύκτας τε καὶ ἤματα τεσσαράκοντα
κεκρύφαται— Hesiod. Opera et Dies, 383.

Μή ποτε Κύρν' ἀγορᾶσθαι ἔπος μέγα· οἶδε γὰρ οὐδεὶς
ἀνθρώπων ὅ τι νὺξ χ' ἡμέρα ἀνδρὶ τελεῖ.
Poëtæ Minores, Theogn. 159.

'Αλλ' ὅτε δὴ νύκτες τε καὶ ἡμέραι ἐξετελεῦντο,
ἂψ περιτελλομένου ἔτεος, καὶ ἐπήλυθον ὧραι.
Homer. Hymn. in Apoll. 349.

Καὶ χορὸν ἱμερόεντα καὶ ἐς φιλοκυδέα κῶμον,
εὐφροσύνην νυκτός τε καὶ ἤματος.
Hymn. in Mercur. 478.

Καὶ ὠκυπόρους
κυμάτων ῥιπὰς ἀνέμων τ' ἐκάλει
νύκτας τε καὶ πόντου κελεύθους
ἄματά τ' εὔφρονα, καὶ
φιλίαν νόστοιο μοῖραν.
Pindar. Pythia, iv. 345.

Μυρίας ὁ μυρίος
χρόνος τεκνοῦται νύκτας ἡμέρας τ' ἰών.
Sophocl. Œdip. Col. 617.

'Εμὲ δὲ συντήξουσι νύκτες ἡμέραι τε δακρύοις.
Euripid. Iphig. in Aul. 398. Dindorfii.

Νύξ τε καὶ ἠριγένεια καὶ ἐκ Διὸς ὁππόσα βουλῆς
γίγνεται. Q. Calaber, ii. 597.

Νὺξ μὲν οὖν ἡμέρα τε γέγονεν οὕτω, καὶ διὰ ταῦτα ἡ τῆς μιᾶς καὶ φρονιμωτάτης κυκλήσεως περίοδος. μεὶς δὲ, κ. τ. λ.[p]—'Επὶ μὲν γὰρ τοῦ μέσου πῦρ εἶναί φασι, τὴν δὲ γῆν, ἓν τῶν ἄστρων οὖσαν,

[p] Plato, Opp. pars iii. ii. Timæus, 39. (=39) 8. Cf. Proclus, D(iv.) 641 = 265. C. et sqq.

κύκλῳ φερομένην περὶ τὸ μέσον νύκτα τε καὶ ἡμέραν ποιεῖν[q].—Ταύτης μὲν ἐνέργειά ἐστι, καθάπερ ἀξόνος, μηδαμοῦ μὲν δυνούσης, μηδὲ ἀνατελλούσης, μενούσης δὲ ἐν τῷ αὐτῷ τόπῳ, καὶ περὶ ταὐτὸ στρεφομένης, ἐνεργούσης δὲ τὴν τοῦ ζωοφόρου κύκλου (the zodiac or ecliptic) (περιφορὰν), παραδιδοῦσαν πᾶν τοῦτο ἀπὸ μὲν νυκτὸς ἡμέρᾳ, ἀπὸ δὲ ἡμέρας νυκτί[r].—Γίνεσθαι δὲ ἰσημερίας δύο καθ' ἕκαστον ἐνιαυτὸν καὶ τροπὰς δύο· ἰσημερίας μὲν ὅταν ἡ νὺξ καὶ ἡ ἡμέρα ἶσαι ὦσι[s]· κ. τ. λ.*

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* Σοὶ δὲ χρὴ τάδε πάντα μέλειν νύκτας τε καὶ ἦμαρ[t].

Ὡς καὶ ἐγὼ πολλὰς μὲν ἀΰπνους νύκτας ἴαυον,
ἤματα δ' αἱματόεντα διέπρησσον πολεμίζων[u].

Σεῦ ἀποτεθνειῶτος· ὅ μοι νύκτας τε καὶ ἦμαρ
εὐχωλὴ κατὰ ἄστυ πελέσκετο[x].

Ἦ γάρ οἱ αἰεὶ
μήτηρ παρμέμβλωκεν ὁμῶς νύκτας τε καὶ ἦμαρ[y].

Οὔ τέ κεν αἰεὶ
μεμνήμην, νύκτας τε καὶ ἤματα δακρυχέουσα[z].

Ἐν δὲ γυνὴ ταμίη νύκτας τε καὶ ἦμαρ
ἔσκ'[a]—

Ἔνθα δύω νύκτας δύο δ' ἤματα κύματι πηγῷ
πλάζετο· πολλὰ δέ οἱ κραδίη προτιόσσετ' ὄλεθρον·
ἀλλ' ὅτε δὴ τρίτον ἦμαρ ἐϋπλόκαμος τέλεσ' ἠώς[b].

Ἔνθα δύω νύκτας δύο τ' ἤματα συνεχὲς αἰεὶ
κείμεθ'[c].

Ἐννῆμαρ μὲν ὁμῶς πλέομεν νύκτας τε καὶ ἦμαρ[d].

Ἑξῆμαρ μὲν ὁμῶς πλέομεν νύκτας τε καὶ ἦμαρ[e].

Ἐγγὺς γὰρ νυκτός τε καὶ ἤματός εἰσι κέλευθοι[f].

Ὀϊζυραὶ δέ οἱ αἰεὶ
φθίνουσιν νύκτες τε καὶ ἤματα δακρυχεούσῃ[g].

Ὅσσαι γὰρ νύκτες τε καὶ ἡμέραι ἐκ Διός εἰσιν[h].

Τρεῖς γὰρ δή μιν νύκτας ἔχον, τρία δ' ἤματ' ἔρυξα[i].

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q Aristoteles, i. 293. 21: De Cœlo ii. 13. De Pythagoræis.

r Stobæus, Eclogæ Physicæ, i. 476. xxii. 9. of the Ἄρκτος, or constellation of the Bear, and one of its stars, considered as the pole-star.

s Ibid. i. 260: ix. 42. Chrysippi.

t Iliad. E. 490. u I. 325. x X. 432. y Ω. 72. z Ib. 744.

a Odyss. B. 345. b E. 388. c I. 74. d K. 28. e Ib. 80. f Ib. 86. g Λ. 182: cf. N. 338. Π. 38. h Ξ. 93. i P. 515.

Ταῦτα φυλασσόμενος τετελεσμένον εἰς ἐνιαυτὸν
ἰσοῦσθαι νύκτας τε καὶ ἤματα[k].

Κλείετε δ' ἀθανάτων ἱερὸν γένος αἰὲν ἐόντων,
οἳ γῆς ἐξεγένοντο καὶ οὐρανοῦ ἀστερόεντος
νυκτός τε δνοφερῆς[l].

Ἐννέα γὰρ νύκτας τε καὶ ἤματα χαλκέος ἄκμων
οὐρανόθεν κατιὼν δεκάτῃ ἐς γαῖαν ἵκοιτο·
ἐννέα δ' αὖ νύκτας τε καὶ ἤματα χαλκέος ἄκμων
ἐκ γαίης κατιὼν δεκάτῃ ἐς Τάρταρον ἵκοι[m].

Ὅθι νύξ τε καὶ ἡμέρα ἆσσον ἰοῦσαι
ἀλλήλας προσέειπον ἀμειβόμεναι μέγαν οὐδὸν
χαλκέον· ἡ μὲν ἔσω μεταβήσεται, ἡ δὲ θύραζεν
ἔρχεται, οὐδέ ποτ' ἀμφοτέρας δόμος ἐντὸς ἐέργει·
ἀλλ' αἰεὶ ἑτέρη γε δόμων ἔκτοσθεν ἐοῦσα
γαῖαν ἐπιστρέφεται· ἡ δ' αὖ δόμου ἐντὸς ἐοῦσα
μίμνει τὴν αὐτῆς ὥραν ὁδοῦ ἔστ' ἂν ἵκηται[n].

Δοιοῖς γὰρ ἐπείγετο δινωτοῖσι
κύκλοις ἀμφοτέρωθεν ὅτε σπερχοίατο πομπὴν[o]
Ἡλιάδες κοῦραι, προλιποῦσαι δώματα νυκτὸς
ἐς φάος ὠσάμεναι κρατερῶν ἀπὸ χερσὶ καλύπτρας[p],
ἔνθα πύλαι νυκτός τε καὶ ἤματός εἰσι κέλευθοι,
καί σφας ὑπέρθυρον ἀμφὶς ἔχει καὶ λαϊνὸν οὐδας[q].

Καὶ ὃς μάλα πολλὰ πέπασται
ἐξαπίνης πάντ' οὖν ὤλεσε νυκτὶ μιᾷ[r].

Tzetzes, De Orphicis. Τῶν δωδεκετηρίδων δὲ ἡ καταρχὴ τοιάδε[s]·
Δεῦρό νυν οὔατά μοι καθαρὰς ἀκοάς τε πετάσσας
κέκλυθι τάξιν ἅπασαν, ὅσην τεκμήρατο δαίμων
ἔκ τε μίης νυκτὸς ἠδ' ἐξ ἑνὸς ἤματος αὔτως.

Ἄστρα τε τηλόσε πάντα καὶ ἀχλὺν νυκτὸς ἐρεμνῆς,
αὐτήν τ' ἠελίοιο θόων προποδηγέτιν ἵππων[t].

Φίλατο δ' αὖ νύκτας τε καὶ ἤματα συννεχὲς αἰεί[u].

Καὶ τόθ' ὑπ' εἰρεσίῃ πλέομεν διὰ νύκτα καὶ ἦμαρ[x].

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k Hesiod. Opera et Dies, 559.
l Theogonia, 105.
m Ibid. 722.
n Ibid. 748.
o Fabricius reads πέμπειν.
p The sense requires κρατερῶν ἀπάτερθε καλύπτρων.
q Parmenides, apud Sextum Empiricum: Adv. Logicos, vii. 393. l. 7. § 111. cf. 392. § 111.
r Theognis, 663. Poëtæ Minores Græci.
s Chilias xii. 152. Histor. 399.
t Orpheus, Argonautica, 343.
u Ibid. 724.
x Ibid. 1058.

Ἐννέα μὲν νύκτας τε καὶ ἤματα μοχθίζοντες[y].

Οἷσί τε καρπὸς
βέβριθεν νύκτας τε καὶ ἤματα συννεχὲς αἰεί[z].

Νύκτα τε πρεσβίστην καλέων καὶ φωσφόρον ἦμαρ[a].

Ἣ φάος ἐκπέμπεις ὑπὸ νέρτερα καὶ πάλι φεύγεις
εἰς ἀΐδην[b].

Δεξιὲ μὲν γενέτωρ ἠοῦς εὐώνυμε νυκτός[c].

Ἐν δὲ δέμας βασίλειον ἐν ᾧ τάδε πάντα κυκλεῖται,
πῦρ καὶ ὕδωρ καὶ γαῖα καὶ αἰθὴρ νύξ τε καὶ ἦμαρ[d].

Βασιλέως Κρόνου καὶ βασιλίσσης Ῥέας πρεσβύτατος πάντων (lege παίδων) Ὄσιρις, θεοῖς ἀθανάτοις· Πνεύματι καὶ Οὐρανῷ, ἡλίῳ καὶ σελήνῃ, καὶ γῇ, καὶ νυκτὶ καὶ ἡμέρᾳ, καὶ πατρὶ τῶν ὄντων καὶ ἐσομένων[e].

Ἶσον δὲ νύκτεσσιν αἰεὶ
ἴσα δ' ἐν ἀμέραις ἁλί-
ον ἔχοντες[f].

Ἀθρόαις πέντε δραπῶν
νύκτεσσιν ἔν θ' ἀμέραις
ἱερὸν εὐζωᾶς ἀωτόν[g].

Τέλει γὰρ εἴ τι νὺξ ἀφῇ
τοῦτ' ἐπ' ἦμαρ ἔρχεται[h].

Αἱ γὰρ ἔμφοβοι
θεαί σφ' ἔχουσι Γῆς τε καὶ Σκότου κόραι[i].

Ἴτ' ὦ γλυκεῖαι παῖδες ἀρχαίου Σκότου[k].

Ἐξίσταται δὲ νυκτὸς αἰανῆς κύκλος
τῇ λευκοπώλῳ φέγγος ἡμέρᾳ φλέγειν[l].

Τοὺς γὰρ ἐν μέσῳ λόγους,
πολλαὶ κυκλοῦσι νύκτες ἡμέραι τ' ἴσαι,
αἳ ταῦτά σοι δείξουσιν Ἠλέκτρα σαφῆ[m].

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y Ibid. 1075.

z Ibid. 1139.

a Hymni. Εὐχὴ, ad Musæum, 29.

b Ibid. iii. Νυκτὸς, v. 10.

c Ibid. viii. Ἡλίου, v. 4. If you face the north (pole of the earth) you have the east on the right, the west on the left.

d Fragmenta, vi. apud Proclum in Timæum: (B. 225=95. B.) Cf. Eusebius, Præp. Evang. iii. 9. 215. E. E Porphyrio.

e Fragm. v. Ὅρκοι Ὀρφικοί. Evander, in Ægyptia Stele, apud Theonem Smyrnæum.

f Pindar. Olymp. ii. 109.

g Pyth. iv. 231.

h Sophocles, Œdipus R. 198.

i Œdipus Col. 39.

k Ibid. 106.

l Ajax, 672.

m Electra, 1364.

Νὺξ γὰρ εἰσάγει
καὶ νὺξ ἀπωθεῖ διαδεδεγμένη πόνον[n].

Μένει γὰρ οὔτ' αἰόλα
νὺξ βροτοῖσιν οὔτε κῆρες οὔτε πλοῦτος[o].

Νυκτός τ' ἀφεγγὲς βλέφαρον ἡλίου τε φῶς
ἴσον βαδίζει τὸν ἐνιαύσιον κύκλον,
κοὐδέτερον αὐτοῖν φθόνον ἔχει νικώμενον[p].

Ἤλυθες ὦ φίλε κοῦρε τρίτῃ σὺν νυκτὶ καὶ ἠοῖ[q].

Οὗ τὸ μυρίον κλέος
διῆλθε κἠπὶ νύκτα καὶ ποτ' ἀῶ[r].

Ὦκα δὲ Καλλιχόροιο παρὰ προχοὰς ποταμοῖο
ἤλυθον, ἔνθ' ἐνέπουσι Διὸς Νυσήϊον υἷα
Ἰνδῶν ἡνίκα φῦλα λιπὼν κατενάσσετο Θήβας
ὀργιάσαι, στῆσαί τε χοροὺς ἄντροιο πάροιθεν,
ᾧ ἐν ἀμειδήτους ἁγίας εὐνάζετο νύκτας[s].

Καὶ λίην οὐ νύκτας ὀΐομαι οὐδέ ποτ' ἦμαρ
σεῦ ἐπιλήσεσθαι προφυγὼν μόρον[t].

Καὶ τότ' ἀναρπάγδην ὀλοὴ Βορέαο θύελλα
μεσσηγὺς πέλαγός τε Λιβυστικὸν ἐννέα πάσας
νύκτας ὁμῶς καὶ τόσσα φέρ' ἤματα[u].

Πονοῦντα δὲ ἔᾳ τὸν ἴδιον ὑψῶσαι βίον
τὴν γῆν ἀροῦντα νύκτα καὶ τὴν ἡμέραν[v].

Χἁ νὺξ ἀνθρώποισιν ἴσα καὶ ὁμοΐος ἀώς[w].

Νυκτός τε κλαίουσα καὶ ἐκ Διὸς ἦμαθ' ὅποσσα[x].

Ἀεὶ δ' ἀνὰ νύκτα καὶ ἠῶ
ἐξ ἁλὸς ἠνεμόεσσά γ' ἐπιβρέμει οὔασιν ἠχή[y].

Αὔτως δ' αὖ νύκτας τε καὶ ἤματα δηριόωντο
Κήτειοι Τρῶές τε καὶ Ἀργεῖοι μενεχάρμαι[z].

Septem ego per noctes totidem cruciata diebus
Fessa malis &c. [a]

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[n] Sophocles, Trachiniæ, 29.

[o] Ibid. 132.

[p] Euripides, Phœnissæ, 503: cf. Hippolytus, 375: Bacchæ, 187, 237, 425, 1008: Hercules Furens, 505.

[q] Theocritus, xii. 1.

[r] Idem, Epig. xix. Εἰς Ἀρχίλοχον.

[s] Apollonius Rhodius, ii. 906.

[t] Ibid. iii. 1078. [u] Ibid. iv. 1232.

[v] Menander apud Clement. Alex. Strom. v. xiv. § 121. p. 83. l. 9: cf. Euseb. Præp. Evang. xiii. 13. § 46. p. 349.

[w] Bion, Eidyll. vi. 18. Poëtæ Minores Græci.

[x] Moschus, Eidyll. iv. 46. Ibid.

[y] Musæus, Hero et Leander, 192.

[z] Quintus Calaber, vii. 148.

[a] Ovid. Metam. ix. 293. Alcmene is speaking of the birth of Hercules: and Ovid shews his attention to propriety here by his imitation of the Greek idiom in such allusions.

Timæus Locrus[b]: *῝Ος ἁμέραν ἀποδίδωτι, τὸν ἀπ' ἀνατολᾶς ἐπὶ δύσιν αὐτῶ δρόμον· νύκτα δὲ τὰν ἀπὸ δύσιος ἐπ' ἀνατολὰν κίνασιν. . . . ἐκ δὲ τούτων τῶν κινασίων δύο ἑασσῶν τὰν ἕλικα* (the ecliptic) *ἐκτυλίσσει, ποθέρπων μὲν κατὰ μίαν μοῖραν ἐν ἁμερησίῳ χρόνῳ, περιδινεύμενος δὲ ὑπὸ τᾶς τῶν ἀπλανέων σφαίρας καθ' ἑκάστην περιόδον ὄρφνας καὶ ἡμέρας.—Γὰ δ' ἐν μέσῳ ἱδρυμένα . . ὅρος τε ὄρφνας καὶ ἡμέρας γίνεται*[c].

Agathemerus: *᾿Αλλ' ἐπὶ μὲν τοῦ ἰσημερινοῦ ὁ δρόμος ἐστὶν ὡς ἔφημεν τοῦ ἡλίου. καὶ ἐπειδὴ τὸ νυχθήμερον κδ' ὧραί εἰσι, διέρχεται δὲ ὁ ἥλιος τὸν ζωδιακὸν κύκλον, καὶ φαίνεται πρωῒ μὲν εἰς τὴν ἀνατολὴν κατὰ τὸν ὁρίζοντα, ἑσπέρας δὲ εἰς δυσμὰς κατὰ τὸν ὁρίζοντα, καὶ νυχθήμερον ἀποτελεῖ· τὸ ἥμισυ ἄρα καὶ μεσαίτατον τῆς γῆς ιβ' ὡρῶν ἔχει διάστημα*[d].

Polybius: *Εἵπετο δ' αὐτοῖς* (the *Μῦθοι* of antiquity) *καὶ Νυκτὸς εἴδωλον καὶ ῾Ημέρας, Γῆς τε καὶ Οὐρανοῦ καὶ ᾿Ηοῦς καὶ Μεσημβρίας*[e].

Plutarch: *῝Α δὲ ῾Ερμογένης ἐφρόνει περὶ τῶν θεῶν ἄξιόν ἐστιν αὐτοῖς ὀνόμασι διαμνημονεύειν· Οὗτοι γὰρ, φησὶν, οἱ πάντα μὲν εἰδότες πάντα δὲ δυνάμενοι θεοὶ οὕτω μοι φίλοι εἰσὶν, ὡς διὰ τὸ ἐπιμελεῖσθαί μου οὔποτε λήθω αὐτοὺς οὔτε νυκτὸς οὔτε ἡμέρας*[f].

Dio Chrysostom: *῾Ο δὲ ἀνὴρ ὁ γενναῖος ἡγεῖται τοὺς πόνους ἀνταγωνιστὰς μεγίστους, καὶ τούτοις ἀεὶ φιλεῖ μάχεσθαι καὶ τὴν νύκτα καὶ τὴν ἡμέραν*[g]—*῎Ετι δὲ ἡλίου καὶ σελήνης νυκτός τε καὶ ἡμέρας*[h].—*Τρεῖς ἐφεξῆς νύκτας τε καὶ ἡμέρας*[i].

Maximus Tyrius: *Οὐχ ὁρᾷς καὶ τὴν σελήνην ἄστρον ἀμφίβιον πρὸς νύκτα καὶ ἡμέραν, ἐν μὲν νυκτὶ λαμπρὰν μετὰ δὲ ἡλίου ἀμαυράν*[k];

Apollonius Dyscolus: *Βώλου* ᾿Επιμενίδης ὁ Κρὴς λέγεται . . *καταλαβούσης αὐτὸν νυκτὸς. . .κατακοιμηθῆναι ἔτη ἑπτὰ καὶ πεντήκοντα. . .ὑπελάμβανε δ' ἐγηγέρθαι τῇ αὐτῇ ἡμέρᾳ ᾗπερ ἔδοξε κεκοιμῆσθαι*[l].

Theodosius: *Οἷς τὸ κατὰ κορυφὴν σημεῖον τοσοῦτον παρήκει ἀπὸ τοῦ φανεροῦ πόλου ὅσον ὁ τροπικὸς ἀπὸ τοῦ ἰσημερινοῦ διέστηκεν· ἐκείνοις ὁ ἥλιος κατὰ μὲν θερινὰς τροπὰς τὸν συνάμφω χρόνον νυκτὸς καὶ ἡμέρας ὑπὲρ τὸν ὁρίζοντα ἐνεχθήσεται, καὶ ἡ ἡμέρα αὐτοῖς ἔσται τριάκοντα ἡμερῶν· κατὰ δὲ χειμερινὰς τροπὰς τὸν συναμφότερον χρόνον νυκτὸς καὶ ἡμέρας ὑπὸ τὸν ὁρίζοντα ἐνεχθήσεται. αἱ δὲ λοιπαὶ ἡμέραι πρὸς τὰς λοιπὰς νύκτας πάντα λόγον ἕξουσιν*[m].—*᾿Εὰν ᾖ ὁ ἐνιαυτὸς ἐξ ὅλων περιφορῶν ἡλίου, τοῦτ' ἔστι ῥητοῦ ἀριθμοῦ νυχθημέρων*[n].—*Διὰ γὰρ τῶν νυχθημέρων συμπληροῦται ὁ ἐνιαυτός*[o]. —Nam cum cœlum omne simplici circumactu volvatur nocte dieque distinctum[p].

[b] De Anima Mundi, Opuscula Mythologica, 551.

[c] Ibid. 552. Cf. Josephus cont. Apion. i. 22, from Hermippus, De Pythagora: also the Cyropædia of Xenophon, vii. v. § 68: viii. i. § 45: viii. v. § 14.

[d] Geographi Min. ii. Agathemerus, lib. i. vi. p. 21.

[e] Lib. xxxi. iii. § 15: cf. Athenæus v. 23, of the Games of Antiochus Epiphanes, celebrated at Daphnæ near Antioch, cir. B. C. 166.

[f] Non posse suaviter vivi secundum Epicurum, cap. xxii.

[g] Oratio viii. tom. i. 280. 5. (Reiske.)

[h] Oratio xii. tom. i. 385. 29.

[i] Oratio lxxviii. tom. ii. 430. 40.

[k] xl. 4. 477. (Markland. Lond. 1740.)

[l] *Περὶ κατεψευσμένης ἱστορίας*, cap. i. (Meursii, Lugduni Batavorum, 1622.)

[m] *Περὶ οἰκήσεων, Προτ. ιβ'*. p. 24. (Sphæricæ Doctrinæ SS.: Dasypodii, 1572): cf. De Diebus et Noctibus, i. *προτ. γ'*. p. 28 · ii. *προτ. α'*. 31: *προτ. β'*. 31: *προτ. ιε'*. 34.

[n] De Diebus et Noctibus, ii. *προτ. ιε'*. 34.

[o] Scholia ad Odyss. T. 306. *Λυκάβαντος*. *Buttmanni, Berolini*, 1821.

[p] Apuleius, De Mundo, ii. 273.

iii. To come however to more specific testimonies:

Of the parts of the night-day, it was universally the rule among the Greeks to reckon the day from sunrise to sunset, and the night from sunset to sunrise.—Ὦ ξεῖνε Μιλήσιε,

Philo Judæus: Τὸ γὰρ αἰσθητὸν καὶ τίμιον φῶς, τὸ καὶ ἑαυτοῦ καὶ τῶν ἄλλων σαφέστατον γνώρισμα, καὶ τοὺς τοκέας αὐτοῦ ἥλιον καὶ σελήνην, καὶ τὸν ἱερώτατον χορὸν τῶν ἄστρων, οἳ νύκτα τε καὶ ἡμέραν ἔτι τε καὶ μῆνας καὶ ἐνιαυτοὺς καὶ ἀνατολαῖς καὶ δύσεσιν ἐπεράτωσαν, ἀριθμοῦ τε φύσιν ἀνέδειξαν, κ. τ. λ.[q]

Ἀπὸ Συρίας μέχρι Ῥώμης θηριομαχῶ διὰ γῆς καὶ θαλάσσης, νυκτὸς καὶ ἡμέρας δεδεμένος δέκα λεοπάρδοις, ὅ ἐστι στρατιωτῶν τάγμα[r].—Ἀλλὰ τοῦτο μὲν ἴσως λεπτότερον. ᾧ δὲ παρακολουθοῦμεν ἅπαντες,.. τίνα ἐν τῷ παντὶ δύναμιν ἀνίσχων ἔχει (lege ἔχων) καὶ καταδυόμενος ὁ θεὸς νύκτα καὶ ἡμέραν ἐργάζεται κ. τ. λ.[s]—Γίνονται δὲ παραλλὰξ ὡρῶν διαδοχαὶ, νυκτὸς καὶ ἡμέρας ἀνακυκλώσεις, ἀναλόγοις ἀναστήμασι συμμετρούμεναι[t].

Λατρεύουσα νύκτα καὶ ἡμέραν[v].—Καὶ καθεύδῃ καὶ ἐγείρηται νύκτα καὶ ἡμέραν[w].—Καὶ διαπαντὸς νυκτὸς καὶ ἡμέρας[x].—Ὅτι τριετίαν νύκτα καὶ ἡμέραν οὐκ ἐπαυσάμην[y].—Ἐν ἐκτενείᾳ νύκτα καὶ ἡμέραν λατρεῦον[z].—Νυκτὸς γὰρ καὶ ἡμέρας ἐργαζόμενοι[a].—Νυκτὸς καὶ ἡμέρας. . .δεόμενοι[b].—Νυκτὸς καὶ ἡμέρας[c].—Νυκτὸς καὶ ἡμέρας[d].—Νυχθήμερον ἐν τῷ βυθῷ πεποίηκα[e].

Lastly, in the Quæstiones et Responsiones of Anastasius of Sinai, the lxxxviith is thus proposed[f]: Πολυθρύλλητος ζήτησίς ἐστι σχεδὸν ἐν ὅλῳ τῷ κόσμῳ, εἰ ἡμέρα προτερεύει τῆς νυκτὸς, ἢ τὸ ἔμπαλιν ἡ νὺξ προτάττεται τῆς ἡμέρας; To this let Proclus, in Timæum, supply the answer; let him shew at least in what way popular opinion and common belief had decided it every where.

Τὴν μὲν δὴ νύκτα προτέραν τῆς ἡμέρας κατέλεξεν, ὡς ἴνδαλμα φέρουσαν τῶν ἀφανῶν καὶ νοερῶν μέτρων. καὶ γὰρ ἡ κοινὴ φήμη προτάττει τὴν νύκτα τῆς ἡμέρας· νυχθήμερον οὖν λέγειν εἰώθαμεν διότι καὶ ἐν ταῖς νοηταῖς αὐτῶν αἰτίαις πρὸ τῆς ἡμέρας αἱ νύκτες ὑπέστησαν[g].—Τίνα οὖν ἡ γῆ παρέχεται τῷ παντὶ χρείαν τοιάδε οὖσα; τοῦτο ἐφεξῆς ὁ Τιμαῖος διασαφεῖ, φύλακα καὶ δημιουργὸν αὐτὴν ἀποκαλῶν νυκτὸς καὶ ἡμέρας...ὅτι δὲ ταύτην τὴν ἡμέραν παρέλαβεν, τὴν περιαγομένην τῇ νυκτὶ, δεδήλωκεν, ὑποτάξας αὐτὴν τῇ νυκτὶ καθάπερ καὶ πρότερον, ἐν οἷς ἔλεγεν νὺξ μὲν οὖν ἡμέρα τε γέγονεν οὕτως[h].

q Opp. i. 347. l. 5. De Plantatione Noë.

r Ignatius, Epistola ad Rom. cap. v. (Patres Apostolici, Jacobson, Oxon. 1838): cf. Ruinart, Acta Martyrum, p. 19.

s Julianus Imperator, Opp. 134. D. Oratio iv. In regem Solem.

t Cyrillus contra Julianum, ibid. lib. iii. 101. E.

v Luke ii. 37.

w Mark iv. 27.

x Mark v. 5.

y Acts xx. 31.

z Acts xxvi. 7.

a 1 Thess. ii. 9: cf. 2 Thess. iii. 8.

b 1 Thess. iii. 10.

c 1 Tim. v. 5.

d 2 Tim. i. 3.

e 2 Cor. xi. 25: cf. Isaiah xxvii. 3: I will keep it night and day: xxxiv. 10: It shall not be quenched night nor day: also Jeremiah xiv. 17.

f P. 488.

g Δ. (iv.) 644=269 D.

h Ibid. 682, 683=282 B.

ἀπαλλάσσεο ἐκ Σπάρτης πρὸ δυντὸς ἡλίου[i].—*Πρὸ δυντὸς ἡλίου ἀπαλλάσσεσθαι ἐκ τῆς Ἀργείων χώρης*[k]. Aristotle describes an insect, which used to appear about midsummer in the river Hypanis on the Cimmerian Bosphorus: and, because it lived exactly *one* day, was called *ἐφήμερον*. And this day was comprehended between sunrise and sunset; the insect being born with the rising and dying with the setting sun. *Ζῇ δὲ καὶ πέτεται μέχρι δείλης, καταφερομένου δὲ τοῦ ἡλίου ἀπομαραίνεται, καὶ ἅμα δυομένου ἀποθνήσκει, βιῶσαν ἡμέραν μίαν· διὸ καὶ καλεῖται ἐφήμερον*[l].

The night in like manner was comprehended between sunset and sunrise. Philostratus[m]: *Καὶ οὔπω ξένε τῶν ἀηδόνων ἤκουσας, οἷον τῷ χωρίῳ ἐναττικίζουσιν, ἐπειδὰν δείλη τε ἥκῃ καὶ ἡμέρα ἄρχηται*; Speaking of the bird called *φαβὴ* Aristotle observes[n]: *Τῶν δὲ φαβῶν ἡ μὲν θήλεια ἀπὸ δείλης ἀρξαμένη τήν τε νύχθ' ὅλην ἐπῳάζει, καὶ ἕως ἀκρατίσματος ὥρας, ὁ δὲ ἄρρην τὸ λοιπὸν τοῦ χρόνου.* According to the law at Athens, quoted by Æschines[o], the *διδασκαλεῖα* or schools were not to be opened before sunrise, (*ἀνοιγέτωσαν μὲν τὰ διδασκαλεῖα μὴ πρότερον ἡλίου ἀνιόντος*,) nor to be kept open after sunset, (*κλειέτωσαν δὲ πρὸ ἡλίου δύνοντος*:) no doubt, because they were to be opened in and for the day-time only; and day began at sunrise, night at sunset. *Ἥλιος ἐπὶ τῶν ὀρῶν ἐσχάτη ὥρα ἔστω* was another of the laws of Solon; and this was transferred, almost verbatim, to the xii Tables at Rome: SOL . OCCASUS . SUPREMA . TEMPESTAS . ESTO[p]. We see the still continuing observance of this mode of reckoning the legal day at Athens, in the circumstances recorded of the death of Socrates, B. C. 399: *Καθάπερ καὶ Σωκράτης...τριῶν (ἡμερῶν) αὐτῷ δοθεισῶν, τῇ πρώτῃ ἔπιεν, καὶ οὐ προσέμεινεν τῆς τρίτης ἡμέρας τὴν ἐσχάτην ὥραν, παρατηρῶν εἴ ἐστιν ἥλιος ἐπὶ τῶν ὀρῶν*[q].—*Καὶ ἦν ἤδη ἐγγὺς ἡλίου δυσμῶν...καὶ ὁ Κρίτων, Ἀλλ' οἶμαι, ἔφη, ἔγωγε, ὦ Σώκρατες, ἔτι ἥλιον εἶναι ἐπὶ τοῖς ὄρεσι καὶ οὔπω δεδυκέναι*[r].

i Herodotus, v. 50.

k Ibid. vii. 149.

l i. 552. 17–23: Historia Animalium, v. 19: cf. Cicero, Tusculanæ Quæstiones, i. 39, 94: Pliny, H. N. xi. 43: Ælian, De Natura Anim. v. 43. who calls it *τὸ μονήμερον τὸ κατὰ τὸν Ὕπανιν*: Antigonus Carystius, Mirabil. Hist. cap. xcii. p. 74. (*Meursii.*)

m Heroica, 636. C. D. (*Morelli*, Parisiis, 1608.)

n i. 564. 18: Historia Anim. vi. 8.

o Contra Timarchum, Orat. i. cap. 3.

p A. Gellius, xvii. 2.

q Stobæus, Anthologium, Περὶ Σωφροσύνης, Tit. v. 67. Ἐκ τῶν τοῦ Τέλητος.

r Plato, Opp. pars ii. iii. 123. (=116.) 19: 124. (=116.) 18. Phædo.

Again as to the parts of a *νυχθήμερον* in conjunction; it was reckoned by the Greeks to consist of a night as such and of a day as such, and as taken in that order too. This was Homer's rule[s], i. e. to reckon the day *in* the night; as may be proved by passages of a very critical nature, which we hope to have a future opportunity of producing. Take however an illustration of what we assert in the following explanation of the well known phrase, *μεθ' ἡμέραν*, from an anonymous author, cited in the Anecdota Parisiensia[t]. Τὸ *μεθ' ἡμέραν λαμβάνεται ἀντὶ τοῦ μετὰ τὸν καιρὸν τῆς ἡμέρας. δοκεῖ δὲ οὐκ ὀρθῶς, διὰ τὴν μετὰ πρότασιν, ὑστεροχρονίαν δηλοῦσαν. ἐκαινοτομήθη ὑπὸ τοῦ χρόνου. οἱ γὰρ παλαιοὶ ῥήτορες νύκτωρ καὶ μεθ' ἡμέραν ἐτίθουν· ὅπερ ἐδήλου ὡς ἂν εἴποι τις, μετὰ τὴν νύκτα (καὶ) τὴν ἡμέραν. οἱ δὲ μεταγινέστεροι τὸ παρηλλαγμένον ζητοῦντες τῆς φράσεως καταλιμπάνοντες τὸ νύκτωρ μόνον τιθέασι τὸ μεθ' ἡμέραν.*

If this explanation is correct, it was the old rule of the Greeks to reckon a night and a day together, as if they were only one, and that one *day;* and to speak of neither apart from the other, nor of both in conjunction except in this way[u]. With regard to the Athenian rule at least in this respect, from as far back as the time of the legislation of Solon; Eustathius quotes from Telephus of Pergamus the following account of the office of the *ἐπιστάτης* at Athens[x]. *Γίνεται γὰρ, φησὶν, ἐπιστάτης Ἀθήνησιν ἐκ τῶν πρυτανέων εἷς, ὃς ἐπιστατεῖ νύκτα καὶ ἡμέραν μίαν, καὶ πλείω χρόνον οὐκ ἔξεστιν οὐδὲ δὶς τὸν αὐτὸν γενέσθαι, τάς τε κλεῖς ἐν αἷς τὰ χρήματά ἐστι φυλάττει, καὶ τὰ γράμματα τῆς πόλεως, καὶ τὴν δημοσίαν σφραγῖδα, κληροῖ δὲ καὶ προέδρους, ἐξ ἑκάστης φυλῆς ἕνα πλὴν τῆς πρυτανευούσης, καὶ πάλιν ἐκ τούτων ἐπιστάτην ἕνα.* The *ἐπιστάτης* then was strictly in office a *night and a day,* not a

s Cf. ad Iliad. T. 141. *χθιζός*: on which the Scholiast observes, *τῇ νυκτὶ τῆς χθὲς ἡμέρας· οὐ γὰρ ἄλλως τὸ χθὲς συμφωνῆσαι. φαίνεται οὖν εἰδὼς προϋποστᾶσαν τὴν νύκτα τῆς ἡμέρας.* Also ad I. 193.

t iv. 258. 14. Παρακολουθήματα Γραμματικά. Cod. 2720.

u Thomas Magister, (Bernard. 1757,) p. 631: *Νυκτὸς καὶ ἡμέρας Ἀττικοὶ λέγουσιν· ἤγουν ἐπὶ τῆς νυκτὸς καὶ ἐπὶ τῆς ἡμέρας ἐλλειπτικῶς ἔξωθεν. ἢ νύκτα καὶ ἡμέραν, ἤγουν κατὰ τὴν νύκτα καὶ κατὰ τὴν ἡμέραν. τὸ δὲ νύκτωρ καθ' ἡμέραν ἁπλῶς Ἕλληνες.* This explanation is not satisfactory. It does away with the idea of oneness or unity in the two things entirely; and represents them as always regarded, as well as spoken of, as distinct.

x Ad Odyss. P. 455. ii. 155. (=641). 49. Cf. Harpocratio, Ἐπιστάτης, and Πρόεδροι: Pollux, Onomasticon, viii. ix. 8. 914, περὶ Ἐπιστάτου: Hesychius, Ἐπιστάτης: Etymologicum Magnum, Ἐπιστάται: Suidas, Ἐπιστάτης.

day and a night; and yet, as the old grammarians tell us, his proper style was ἄρχων ἐφήμερος, as well as ἐπιστάτης: ὁ δὲ μίαν ἡμέραν τὰ ὅλα διοικῶν ἄρχων ἐφήμερος καὶ ἐπιστάτης καλεῖται.

Again there are four dates in the Magna Compositio, reported by Ptolemy after Timocharis, (a Grecian astronomer, and most probably an Athenian,) and given both in the Attic style as used by him, and in the Egyptian as followed by Ptolemy. A comparison of these together demonstrates that according to the Attic rule every νυχθημέρον of the calendar must have been reckoned from sunset, (6 p. m. in general,) just as much as, according to Ptolemy's rule, from noon.

i.[y] *Timocharis.*	*Ptolemy.*
Anthesterion 8.	Athyr 29. εἰς τὴν λʹ.
ὥρας γʹ ληγούσης.	πρὸ γʹ ὡρῶν τοῦ μεσονυκτίου καιρικῶν.

The Julian date to which both these correspond is January 29, 8 h. 40 m. p. m. B. C. 283 = Nab. 465: Athyr 29, 8 h. 40 m. by Ptolemy's rule, Athyr 30, 2 h. 40 m. by the common Egyptian rule, Anthesterion 8, 2 h. 40 m. according to the Attic. It is manifest then that the Attic rule, in this instance, did not differ from the common Egyptian one; and that both Athyr 30 according to that, and Anthesterion 8 according to the former, must have entered their respective calendars about the same time; i. e. January 29, at 18 h. from midnight, or 6 p. m. of mean time, according to the proper Julian rule, B. C. 283.

ii.[z] *Timocharis.*	*Ptolemy.*
Elaphebolion 15.	Tybi 5. εἰς τὴν ϛʹ.
ὥρας γʹ ἀρχομένης.	πρὸ δʹ ὡρῶν τοῦ μεσονυκτίου καιρικῶν τε καὶ ἰσημερινῶν.

The Julian date in this instance is March 9, 8 h. 0 m. p. m. B.C. 294 = Nab. 454: Tybi 5, 8h. 0m. according to Ptolemy's rule, Tybi 6, 2 h. 0 m. according to the common Egyptian; Elaphebolion 15 at 2 h. according to the Attic. From which state of the case the inference is the same as before; viz. that this 15th day of Elaphebolion in the Attic style, and this 6th day of Tybi in the Egyptian, each entered its proper

[y] Magna Compositio, lib. vii. iii. 21. [z] Ibid. lib. vii. iii. 23.

calendar at 18 h. from midnight, or 6 p. m. of mean time, March 9, B. C. 294.

iii.[a] *Timocharis.*	*Ptolemy.*
Pyanepsion 25.	Thoth 7. εἰς τὴν η΄.
τῆς ι΄ ὥρας ὅσον ἡμιωρίου προελθόντος.	μετὰ γ΄ ϛ″ (3 h. 30 m.) ὥρας καιρικὰς τοῦ μεσονυκτίου.

The Julian date here is November 9, 3 h. 7 m. a. m. B. C. 283=Nabon. 466: Thoth 7 at 15 h. 7 m. by Ptolemy's rule, Thoth 8 at 9 h. 7 m. by the vulgar Egyptian, Pyanepsion 25 at 9 h. 7 m. according to the Attic of Timocharis: which day of Pyanepsion, like the corresponding one of Thoth, must have been reckoned from November 8, about 6 p. m. of mean time, B. C. 283.

iv.[b] *Timocharis.*	*Ptolemy.*
Posideon 25.	Phaophi 16. εἰς τὴν ιζ΄.
ὥρας ι΄ ἀρχούσης.	μετὰ γ΄ ὥρας καιρικὰς τοῦ μεσονυκτίου.

The Julian date in this case too is December 21 at 3 h. 24 m. B. C. 295=Nabon. 454: Phaophi 16 at 15 h. 24 m. according to Ptolemy's rule, Phaophi 17 at 9 h. 24 m. according to the common one, Posideon 25 at 9 h. 24 m. also, according to the Attic. This Attic date therefore must have been reckoned from 18 h. from midnight, or 6 p. m. of mean time, the evening before.

Thus much may suffice for the illustration of the Attic rule in particular. We will now pass to that of the Greeks in general, or in all parts of the ancient world, both the mother country and abroad.

ii. *Rule of Elis.*—In the calendar of Elis, according to Pausanias[c], there was one day, set apart by the women, and dedicated by them to certain ceremonies in honour of Achilles. This day made one of the Olympic feriæ, or days of the Olympic πανήγυρις; and the ceremonies by which it was signalized were of the nature of parentalia, obsequies, or funereal rites, annually repeated in memory of Achilles. Out of what matter of fact, handed down by tradition, this custom arose, we hope to have a future opportunity of explaining. Now

[a] Ibid. p. 24. [b] Ibid. p. 26. [c] vi. xxiii. 2.

these ceremonies began at *sunset*. We infer from this coincidence that both the Olympic feriæ and the civil day at Elis were reckoned from sunset. Ἀχιλλεῖ δὲ οὐ βωμὸς κενὸν δέ ἐστιν αὐτῷ μνῆμα ἐκ μαντείας. τῆς πανηγύρεως δὲ ἀρχομένης, ἐν ἡμέρᾳ ῥητῇ περὶ ἀποκλίνοντα ἐς δυσμὰς τοῦ ἡλίου τὸν δρόμον αἱ γυναῖκες αἱ Ἠλεῖαι ἄλλα τε τοῦ Ἀχιλλέως δρῶσιν ἐς τιμὴν, καὶ κόπτεσθαι νομίζουσιν αὐτόν.

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iii. *Rule of Bœotia.*—In the Bœotian calendar, according to Pindar, the annual festival to the memory of the children of Hercules and Megara began at sunset, and lasted all night; and on the second day, (which means not the day after this night, but the day but one,) the games in honour of Iolaus, and called by his name, were wont to be celebrated: so that the annual ceremony of the former kind lasted strictly *a night and a day;* which nevertheless are reckoned by Pindar as equivalent only to one day.

Τῷ μὲν Ἀλεκτρᾶν ὕπερθεν
δαῖτα πορσύνοντες ἀστοὶ
καὶ νεόδματα στεφανώ-
ματα βωμῶν αὔξομεν
ἔμπυρα χαλκοαρᾶν ὀκτὼ θανόντων,
τοὺς Μεγάρα τέκεν οἱ Κρεοντὶς υἱούς.
τοῖσιν ἐν δυσμαῖσιν αὐγᾶν
φλὸξ ἀνατελλομένα συνεχὲς
παννυχίζει, αἰθέρα κνι-
σᾶντι λακτίζοισα κάπνῳ·
καὶ δεύτερον ἆμαρ* ἐτεί-
ων τέρμ' ἀέθλων
γίνεται κ', τ. λ. Isthmia, iv. 104.

* The Scholiast observes on the words δεύτερον ἦμαρ—Ἀμφίβολον πότερον μετὰ θυσίαν, ταῖς ἑξῆς ἡμέραις δύο, ὁ ἀγὼν τῶν Ἡρακλείων συντελεῖται ... ἢ δεύτερον ἦμαρ τὸ μετὰ τὴν θυσίαν, ὡς τῇ ἐπιφωσκούσῃ τοῦ ἀγῶνος ἀγομένου, τῇ ὑστεραίᾳ.

But δεύτερον ἦμαρ is used in this instance, like *dies alter* in Latin: not for the *next* day, but for the *next but one*. One night and its accompanying day were devoted to the parentalia in memory of the dead: the next day the games began.

Hercules himself, according to tradition[d], was born at the gate of Thebes called that of Electra. See more, in reference to these games, in

[d] Scholia ad Iliad. T. 99.

iv. *Rule of Thessaly.*—According to Philostratus, the Thessalians were bound to perform a particular ceremony at the tomb of Achilles every year, *by night:* Καὶ μὴν καὶ ὕμνων ἐκ Θετταλίας ὁ Ἀχιλλεὺς ἔτυχεν· οὓς ἀνὰ πᾶν ἔτος φοιτῶντες ἐπὶ τὸ σῆμα ᾖδον ἐν νυκτὶ, τελετῆς τι ἐγκαταμιγνύντες τοῖς ἐναγίσμασιν, ὡς Λήμνιοί τε νομίζουσι, καὶ Πελοποννησίων οἱ ἀπὸ Σισύφου[e]: from which last observation it may be inferred that the Lemnian and the Corinthian rule of the noctidiurnal reckoning was the same with the Thessalian. And this ceremony was so strictly to be confined to the *night,* that, according to the same authority, the μῆνις of the hero was excited against this people, because, in the course of time, it had come to be celebrated by day[f]: the date of which innovation on the ancient rule he gives us to understand was that of Alexander's victory over Darius, and of his expedition to India, B. C. 330 or 329. He speaks also of a similar sacrifice to Achilles in the Λευκὴ Νῆσος, in the Euxine or Black sea, which was bound to begin at sunset, and yet to be over before the night set in: Δεῖ γὰρ προσορμίσαντας τῇ νήσῳ καὶ θύσαντας ἡλίου δυομένου, ἐσβατεύειν (embark again in order to depart or to pass the night at sea) μὴ ἐννυχεύοντας τῇ γῇ[g].*

the Scholia on Pindar[h]. The prize at these, or at those in honour of Iolaus, was a wreath of myrtle[i].

Antoninus Liberalis informs us[j] that the Heraclea at Thebes were ushered in by a sacrifice to Galinthias, daughter of Prœtus, and a contemporary of Alcmene; turned into a weasel for the part she took at the birth of Hercules: Ταῦτα μὲν ἔτι τὰ ἱερὰ Θηβαῖοι φυλάττουσι, καὶ πρὸς Ἡρακλέους ἑορτῇ θύουσι Γαλινθιάδι πρώτῃ.

* It is no objection to the force of the argument, founded on such matters of fact as those adduced above, that according to a distinction made by the scholiasts and commentators of antiquity, honours and ceremonies to the memory of heroes were to be celebrated at sunset, rites and observances in honour of the gods, at sunrise. Ἔθος πρὸς δυσμὰς ἱερουργεῖν τοῖς ἥρωσι, κατὰ τὰς ἀνατολὰς τοῖς θεοῖς[k]. On this principle the scholiasts on Homer explained his phrase of ἱερὸν ἦμαρ: Ἱερὸν καλεῖται τὸ ἕως μεσημ-

e Heroica, 715. D. Cf. 717. A. 718. B. where this ceremony is described as all completed between the beginning of night on one day and daybreak on the next.

f Heroica, 719. A.

g 722. A. Cf. 721. B. C: 722. D: 724. D.

h Ad Olymp. ix. 148: vii. 153, 154: Nemea, iv. 32. Isthmia, i. 11.

i Isthmia, iv. 117.

j Metamorphoses, xxix. apud Historiæ Poeticæ SS. Antiquos, Parisiis. 1675.

k Scholia ad Pind. Isthmia, iv. 110. Cf. Scholia ad Argonautica Apollonii Rhodii, i. 587.

v. *Rule of Bithynia.*—Attalus, a commentator on Aratus, quoted by Hipparchus, had this observation: Ἐπεὶ γάρ ἐστιν

βρίας, (ἕως ὥρας ἕκτης,) ἡνίκα αἱ θυσίαι γίνονται, καὶ τὰ πρακτικὰ πάντα[l]—*Ἱερὸν ἦμαρ σημαίνει τὸν πρὸ τῆς μεσημβρίας καιρὸν, τουτέστιν ἀπὸ πρωῒ ἕως δείλης. κατὰ τοῦτον γὰρ τὸν χρόνον ἔθυον τοῖς Ὀλυμπίοις θεοῖς . . . . ἀπὸ δὲ μεσημβρίας ἔθυον τοῖς καταχθονίοις*[m].

This distinction indeed rather confirms than invalidates the primitive rule of reckoning the noctidiurnal cycle; at least if that was to be considered from the first the proper characteristic of the cycle, as the measure of human time. A different rule of the cycle might be considered proper for the gods, and a different one for men; and therefore for the ceremonies in honour of the gods, and for those in honour of heroes, who, even though deified after their death, and received into the number of the gods, had nevertheless once been men.

The truth however is that all these ceremonies in honour of heroes (that is, of those who had once been men, and had lived and died like other men) partook of the nature of Parentalia, or funereal obsequies; and so far of *τέλη*, or *τελεταὶ*, *initia*, or *mysteries*; of which it was an universal rule to begin at night and to be solemnized in the night. *Ὁ γὰρ ἐπὶ Μελικέρτῃ τεθεὶς αὐτόθι (ἀγὼν)*, observes Plutarch of the Isthmian games[n] before the time of Theseus, *νυκτὸς ἐδρᾶτο, τελετῆς ἔχων μᾶλλον ἢ θεᾶς καὶ πανηγυρισμοῦ τάξιν.* The Eleusinian mysteries, the most illustrious of all among the Greeks, were celebrated by night. The mysteries of Trophonius at Lebedea were celebrated by night[o]. The Samothracian mysteries were celebrated at night[p]. The Dionysia, every where, began at night, and were celebrated in the night.

Νύκτωρ τὰ πλεῖστα· σεμνότητ᾽ ἔχει σκότος.—Bacchæ, 486.

The particular ceremonies in honour of the Dii Manes, of Hecate, of the Furies or Eumenides, could be performed only at night, and properly only in the dead of night—

ὥραν οὐδενὸς κοινὴν θεῶν.—Eumenides, 109.

No doubt because, in all such ceremonies and acts of devotion as these, regard was studiously to be paid to the primordial state of the being and of the relations of things; in particular to the fact that night was older than day, and that darkness was a more elementary state of existence than light.

Pausanias observes of the Dionysia on the *Λίμνη Ἀλκυωνία* near Lerna[q]: *Τὰ δὲ ἐς αὐτὴν Διονύσῳ δρώμενα ἐν νυκτὶ κατὰ ἔτος ἕκαστον οὐχ ὅσιον ἐς*

[l] Ad Iliad Λ. 84. Cf. ad Il. Σ. 277: and Φ. 110, 111: and Eustath. iv. 69, 51: Il. Σ. 277: ad Odyss. iv. 447: i. 176 (=179) l. 16: and Od. ix. 56: i. 321 (=1614), l. 41.

[m] Etymologicum Magnum: Ἱερὸν ἦμαρ. Cf. Eustathius ii. 188 (=579), 38: Il. Θ. 65: iii. 11 (=765) 48: Il. Λ. 84.

[n] Theseus, xxv.

[o] Pausanias, ix. xxxix. 4.

[p] Apollonius Rhod. Argonautica, i. 915—921.

[q] ii. xxxvi. § 6. 7: xxxvii. § 3.

ἀρχὴ νυκτὸς ἡλίου δύσις[q]. Now, as Hipparchus was a Bithy-

ἅπαντας ἦν μοι γράψαι[r]. And of Apollo surnamed *Δειραδιώτης* at Argos[s]: *Ἡ δέ οἱ μαντικὴ (μαντεύεται γὰρ ἔτι καὶ ἐς ἡμᾶς) καθέστηκε τρόπον τοῦτον... γυνὴ κ', τ. λ... θυομένης δὲ ἐν νυκτὶ ἀρνὸς κατὰ μῆνα ἕκαστον κ', τ. λ.* And speaking of the stated sacrifice of a dogwhelp to Mars at Sparta, and of that of a bitchwhelp to Hecate at Colophon, he observes: *Νυκτεριναὶ δὲ αἵ τε Κολοφωνίων θυσίαι καὶ τῶν ἐν Λακεδαιμόνι ἐφήβων καθεστήκασιν*[t]. In like manner, of the god surnamed Æsymneta at Patræ he tells us: *Μιᾷ δὲ ἐν τῇ ἑορτῇ νυκτὶ ἐς τὸ ἐντὸς φέρει τὴν λάρνακα ὁ ἱερεύς· αὕτη μὲν δὴ ἡ νὺξ γέρας τοῦτο εἴληφε*[u]. And of the *θεοὶ μειλίχιοι* at Amphissa: *Νυκτεριναὶ δὲ αἱ θυσίαι θεοῖς τε τοῖς Μειλιχίοις εἰσὶ, καὶ ἀναλῶσαι τὰ κρέα αὐτόθι πρὶν ἢ ἥλιον ἐπισχεῖν νομίζουσι*[x].

In short, we may assert without fear of contradiction, that the proper beginning of all the Greek feasts as such was evening or sunset; and that they were strictly *παννυχίδες*. For this reason, Pausanias tells us that the feast of *Ἄρτεμις Τρικλαρία* among the Achæans[y] (the Ionians of Achaia in the Peloponnese,) and of Diana Laphria at Patræ more particularly[z], was a *παννυχίς*. Who has not heard of the *Pervigilia* of antiquity? who has not read the *Pervigilium* Veneris? Hence too, the *κῶμοι* or triumphal rejoicings of the *ἱερονῖκαι*, the victors in the sacred games, were *παννυχίδες* also; beginning at evening and lasting through the night: *Ἔθος γὰρ ἦν καὶ παννυχίδας ὕμνων τοῖς νενικηκόσιν ἀποτελεῖσθαι*[a]. And Pindar himself dates the commencement of such rejoicings, as first celebrated at Olympia in the time of Hercules, just with the rising of the full moon in the evening[b]; and elsewhere recognises evening (*τὸ ἀκρέσπερον*, the setting in of evening) as the stated time of the same thing in general:—

Ὄφρα Θέμιν ἱερὰν Πυθῶ-
νά τε καὶ ὀρθοδίκαν
γᾶς ὀμφαλὸν κελαδῆτε ἄ-
κρᾳ σὺν ἑσπέρᾳ.—Pythia, xi. 15.

And to produce only one more proof of the same custom; In Libanius' funeral panegyric on the memory of the emperor Julian, A. D. 363, having just given an account of his victory over the Alemanni, A. D. 357[c], (when he made their king Chnodomarius prisoner,) which happened to have been won about sunset, he observes: *Καὶ ὁ μὲν ἥλιος τοιοῦτον ἔργον ἐπιδὼν ἔδυ*[d]: and then, directly after, in allusion to the rejoicings for the victory the same evening, he breaks out into the following apostrophe: *Τίνα*

[q] Comment. in Arati Phæn. lib. ii. cap. ii. Uranologium, 210. D.

[r] xxxvii. 5. Cf. vii. xxvii. § 1, of the feast of Dionysos, surnamed *Λαμπτὴρ*, at Pellene in Arcadia.

[s] ii. xxiv. 1.

[t] iii. xiv. § 9.

[u] vii. xx. § 1.

[x] x. xxxviii. § 4.

[y] vii. xix. § 1.

[z] Ibid. xviii. 7.

[a] Scholia in Pindarum, ad Nemea, vi. 64.

[b] Olymp. iii. 33: x. 90.

[c] Cf. Ammianus Marc. xvi. cap. xi. p. 101—119, Biponti.

[d] I. 542, 543 (Reiskii) xviii. *Ἐπιτάφιος ἐπὶ Ἰουλιανῷ.*

nian *, it is most probable that Attalus was so too; and consequently that this observation is to be understood of the Grecian rule of the noctidiurnal cycle in Bithynia. At least we may take it for granted that the rule of Hipparchus did not differ from that of Attalus, whom he was quoting, and on whom he was commenting. The language of Attalus is the same as that of the Scholiast on Pindar[e], Ὅτε γὰρ ὀψὲ τῆς ἡμέρας ἐστὶ, τότε ἀρχὴ τῆς νυκτὸς ἀφ' ἑσπέρας: and as that of Ulugh Begh[f]: Principium diei est finis noctis; et finis hujus est initium illius.

In illustration however of the Græco-Bithynian rule in this respect, we may most properly appeal to the date quoted by Ptolemy[g] from Agrippa, a Bithynian astronomer, who appears to have flourished in the reign of Domitian: Metroüs 7, according to the Bithynian calendar of this time, *νυκτὸς ὥρας γ' ἀρχούσης*, concurring, according to Ptolemy, with Tybi *β' εἰς τὴν γ'*, in the Egyptian, *πρὸ δ' μὲν ὡρῶν καιρικῶν τοῦ μεσονυκτίου, πρὸ ε' δὲ ἰσημερινῶν.*

The reduction of the latter date gives November 29 at 7 h. p. m. A. D. 92, Domitiani 12 = Nabon. 840, Tybi 2 at 7 h. from noon, Tybi 8 at 1 h. from sunset mean time, Metroüs 7 at the 3rd hour *ineunte* of kairic time. This seventh day then of the Bithynian month Metroüs must have been reckoned,

τῶν παρ' Ἕλλησιν ἑορτῶν παρέβαλεν ἄν τις τῇ τότε ἑσπέρᾳ[h]; The Greek feasts then, even those of the most joyous description, in his time still notoriously began in the evening.

* Suidas: Ἵππαρχος, Νικαεὺς, φιλόσοφος, γεγονὼς ἐπὶ τῶν ὑπάτων, ἔγραψε περὶ τῶν Ἀράτου φαινομένων κ', τ. λ. In the Vita Arati, the author of the commentary on the Φαινόμενα is called Ἵππαρχος ὁ Βιθυνός: Vita 3[a]. tom. ii. p. 445. (Bühle); cf. the commentary itself, lib. i. cap. i. Uranolog. 172. A. Hipparchus of Bithynia is mentioned by Strabo, xii. iv. cir. finem. Aurelius Victor, in his life of Constantine, tells us by the way that Marcus Bojonius (meaning Marcus Aurelius) fined the people of Nicæa in Bithynia in the payment of a certain amount of oil and corn; Quod Hipparchum præstanti ingenio indigenam fuisse ignoravissent. Ælian mentions Hipparchus of Nicæa, as if a contemporary of Nero's, (Histor. Anim. vii. 8,) which must be a mistake. Cf. Eustathius, ad Dionys. Periegetem, 473.

e Ad Isthmia, iv. 58.

f Epochæ Celebriores, Prolegomena, 4.

g Lib. vii. iii. 22.

h 543. l. 7.

according to the calendar, from sunset apparent time, November 29; and the first, from sunset apparent time, November 23.

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vi. *Rule of Pergamus.*—Galen[i]: Ἔστω δὴ συνεχὴς μὲν ὁ πυρετὸς, διὰ τρίτης δ' οἱ παροξυσμοί· καὶ τῇ τρίτῃ μὲν τῶν ἡμερῶν ἑνδεκάτης ὥρας, τῇ πέμπτῃ δὲ νυκτὸς ὥρας πρώτης παροξυνέσθω· τῇ δὲ ἑβδόμῃ νυκτὸς ὥρας τρίτης· ἀεὶ γὰρ ὑποκείσθω δυοῖν ὥραιν ὑστερίζειν τὸν παροξυσμὸν, ὥστε καὶ τῆς ἐννάτης νυκτὸς ὥρᾳ πέμπτῃ παροξυνθήσεται, καὶ τῆς ἑνδεκάτης ἑβδόμῃ. Galen, it appears, includes the night in the day[k]; as indeed the writers on the *res medica* in such cases generally do[l]. It must be inferred from the above passage that he reckoned his νυχθήμερον (as made up of both) from evening to evening, not from morning to morning, or from midnight to midnight, or in any other way. For his first paroxysm is dated by hypothesis on the *third* day at the *eleventh* hour of that day. His second two *days* and two *hours* later; i. e. on the *fifth* day at the *first* hour of night: and so on; every succeeding paroxysm being two days and two hours complete, (50 hours in sequence,) later than the preceding. On this principle, each day must have been reckoned a continuous period of 24 hours, including a night and a day; of which the night preceded the day: otherwise the first paroxysm never could have been dated one hour before the end of the third day, yet the second one hour after the beginning of the fifth.

The rule of Galen in this instance then was clearly such as to reckon the 24 hours of day and night together from evening: and there is no reason to suppose that there was any thing peculiar to *his* rule in this instance, or that such was not his ordinary mode of reckoning these 24 hours: and if so, that it was not also the ordinary rule of Pergamus, where he was born and bred up, and where he was writing at this very time—as we hope to shew more at large on a future occasion. Nor, for any thing which we know or have any reason to suppose to the contrary, could the rule of Pergamus in this respect and at this time have been any thing different from that of the

[i] Opp. ix. 800. 11: περὶ κρισίμων ἡμερῶν, i. 7.

[k] Ib. 642, περὶ κρίσεων, ii. 2.

[l] Cf. Stobæus, Anthologium, περὶ ὑγιείας, Tit. ci. 15, Ἀντύλλου: Ἡμέραν λαμβάνομεν σὺν τῇ νυκτί.

rest of the Greek settlements in Asia Minor at the same time; or from the common rule of Asia Minor in the same respect every where.

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vii. *Rule of Samosata* (*on the Euphrates*).—We have no means of illustrating this rule except by the testimony of Lucian, who was a native of Samosata: and Lucian writes in such a variety of characters, and so much like a person who was never serious or in earnest in any, that we can scarcely be certain that he is writing or speaking any where, or about any thing, gravely, or in his proper capacity of a native of Samosata. We are persuaded however that, with respect to this one point of the popular mode of reckoning the day and night, the rule of Samosata in Lucian's time did not differ from that of the Greeks every where else. We shall therefore quote from his works whatsoever may be found therein, calculated to illustrate this rule; as applicable to either indifferently.

De Demosthenis Encomio[m]: the birthday of Homer is reckoned the 16th of the month, and this sixteenth is dated from evening[n]. In his Krono-Solon[o]; Νόμοι δεύτεροι: the day before the feast, (the Roman Saturnalia,) is supposed to end at sunset: Τῇ δὲ πρὸ τῆς ἑορτῆς...εἶτα περὶ δείλην ὀψίαν... κατανείμαντες αὐτὸν κατ' ἀξίαν ἑκάστῳ πρὶν ἥλιον δῦναι πεμπόντων τοῖς φίλοις. This is meant of the Saturnalia indeed, and is supposed to be passing at Rome. But the Roman rule was to reckon the day from midnight: which makes the contrast only more striking.

In his Deorum Concilium however, the assembly and decree of the gods, (the forms of which in other respects he purposely copies from those of the ἐκκλησίαι at Athens,) are both dated by *night*: which it would be difficult to explain on any principle but that of the supposition that according to the Divine rule of the reckoning of time continually, whatsoever the human might be, it must begin with night, and not with day: 'Εκκλησίας ἐννόμου ἀγομένης, ἑβδόμῃ ἱσταμένου, (Apollo's *day*, and he is ἐπιστάτης on the occasion,) ὁ

m Opp. iii. 490. § 1. 1—19. n Ibid. 491. § 1—12: 492. § 2. 31—39.
o Ibid. 396. § 14. cf. 399. § 16. 62.

Ζεὺς ἐπρυτάνευε, καὶ προήδρευε Ποσειδῶν, *ἐπεστάτει* Ἀπόλλων, *ἐγραμμάτευε* Μῶμος, *τῆς νυκτὸς, καὶ ὁ* Ὕπνος *τὴν γνώμην εἶπεν* [p], *κ*, *τ. λ.*

viii. *Rule of Cappadocia.*—Gregory of Nyssa [q]: Εἶτα *πρὸ τοῦ σαββάτου νὺξ, καὶ μετὰ ταύτην ἡ τοῦ σαββάτου ἡμέρα ... ἀρχὴ δὲ ἣν τῆς νυκτὸς ἐκείνης ἡ ἑσπέρα ἣν διαδέχεται ἡ μία τῶν σαββάτων ἡμέρα.*—Πληροῦται *δὲ ἑβδομὰς ἑκάστη ταῖς μετὰ τὸ σάββατον ἡλίου δυσμαῖς* [r].

There is no reason to suppose that Gregory is speaking here of any manner of reckoning the beginning or the end of the day, or the beginning or the end of the week, peculiar to the church, and not common to the people at large; or peculiar to Nyssa, and not general in Cappadocia. But if not; while this testimony ascertains the rule of Nyssa, it certifies us of that of Cappadocia also; viz. that of reckoning every day of the week, beginning with the first, from sunset to sunset. To his testimony we may add that of Basil his brother, Primate of Cæsarea in Cappadocia; which will prove the same thing of the rule of Cæsarea, (anciently Mazaca,) the metropolis of Cappadocia itself.

This testimony is contained in his homilies *De jejunio.* It is necessary however to premise that, with respect to the quadragesima or Lent of the church at Cæsarea, or of Cappadocia, it was the rule at this time, to keep seven weeks nominally from the beginning to the end of Lent; but to fast, in reality, only five days out of the seven, in every week; the two days excepted being the Sabbath, (our Saturday,) and the Lord's day, (our Sunday.) The same testimony proves also that the time of supper or of the principal meal in the day at Cæsarea was evening too, or after sunset*;

* With regard to this particular custom of antiquity; it seems to have been general in the East; where supper, from time immemorial, was not only the last, but the principal meal of the day [s], and always made in the evening. According to the Hermes Trismegistus of Apuleius [t], supper-time in Egypt was later than sunset even in his days.

The Greeks, who settled in the east, appear to have adopted the same rule

[p] Opp. iii. 536. Deorum Concilium, 14. 30.

[q] Opp. i. 822. D. (Ducæi, 1615) Oratio Prima, De Christi Resurrectione.

[r] Ibid. 832. C—D. Oratio ii.

[s] See our Exposition of the Parables.

[t] ii. 324.

at what must be considered the beginning of the day, so reckoned from evening, not the end.

Now both these homilies *De jejunio* were delivered in Lent: and the second[u] promises a series of such discourses, twice a day, during the continuance of the Lent fast. From one of Basil's homilies in general[x], it may be inferred that double sermons, so delivered (every day) in Lent, were delivered *νυκτὸς καὶ ἡμέρας*—first in the evening, then in the morning; and that, because the parts of the day themselves were reckoned in that order, and not conversely*.

of daily life; though in the mother country supper-time was not so late in the day. We may collect this fact of the Greeks of Antioch at least, from various allusions in the extant orations of Libanius. For example, where he is giving an account of the way in which his younger brother came to lose his sight; having been attacked with a cold, a rheum or deflux of some kind, the night before, followed by the loss of sight the next morning: *Τοῦ γὰρ δὴ πρὶν συνδειπνοῦντος ἀπεστερήμην, συνόντος ἐπὶ τῆς κλίνης, παρὰ τῆς ἐν τῇ ἡμέρᾳ νυκτὸς τῇ νυκτὶ παραδεδομένου*[y]. The meaning of which is, that while he was at supper in the natural night-time the evening before, he had been delivered up by the night of nature, (which was only temporary,) to the night of blindness, (which was perpetual.)

The same custom appears from another allusion[z]; the occasion of which is supposed to have been evening, when people were going *λελουμένοι ἐπὶ δεῖπνα*, and *ὑπὸ λαμπάδων*, that is, in *the dark*: which is explained by its being winter[a]. It appears from other parts of his orations[b] that supper-time was not only eventide, but night as such.

* The homilies on the Hexaëmeron were delivered twice a day, once in the morning and once in the evening: Hom. iii. § 1: vii. 6: viii. 8, ad fin.: ix. 6, ad fin. In this last he concludes: *Ἀλλὰ σιωπὴν γὰρ ἡμῖν ἐπιτάσσει ἡ ἑσπέρα πάλαι πρὸς δυσμὰς τὸν ἥλιον παραπέμψασα . . . ἄπιτέ μοι χαίροντες ἡ φιλόχριστος ἐκκλησία, ἀντὶ παντὸς ὄψου πολυτελοῦς καὶ τῶν ποικίλων καρυκευμάτων τῇ μνήμῃ τῶν εἰρημένων τὰς σεμνὰς ὑμῶν κατακοσμοῦντες τραπέζας.* From which it appears that, though the homily was not finished until long after sunset, the people had still their supper to get.

In another instance (in Ps. cxiv. 1.) they were dismissed at the close of an homily of Basil's, even to their morning's meal, only at noon; having waited in the church all the time before from midnight, in expectation of his coming; who had been detained at half a day's journey distant by some unexpected impediment.

u Opp. ii. 16. A. § 8. (E Congregatione Sti Mauri.)

x Ib. 122 E. Hom. xiv. § 1. *Κατὰ μεθυόντων.*

y i. 126. l. 14—127. 10. *Λογ.* i. *Περὶ τῆς ἑαυτοῦ τύχης.*

z i. 246. 1. vii. 247. 4, 5. Ov. vii. *Ὅτι τὸ πλουτεῖν, κ', τ. λ.*

a Ibid. 246. 5.

b ii. 451. 1—3. xlv. *Περὶ τῶν δεσμωτῶν*: i. 359. 11—18. xi. *Ἀντιοχικός.*

Such was the case at least with the first of these two *De jejunio.* Νηστεία (he observes) *πόλεως εὐσχημοσύνη, ἀγορᾶς εὐστάθεια, οἴκων εἰρήνη, σωτηρία τῶν ὑπαρχόντων. βούλει αὐτῆς ἰδεῖν τὴν σεμνότητα; σύγκρινόν μοι τὴν σήμερον ἑσπέραν τῇ αὔριον* (the evening of the Saturday, the first day of the quadragesima, when the homily was delivered, with the evening of Sunday, the first of the five days' fast in the first week of Lent,) *καὶ ὄψει τὴν πόλιν ἐκ ταραχῆς καὶ ζάλης εἰς γαλήνην βαθεῖαν μεταβαλοῦσαν. εὔχομαι δὲ καὶ τὴν σήμερον τῇ αὔριον ἐοικέναι κατὰ τὴν σεμνότητα, καὶ τὴν αὔριον μηδὲν τῇ φαιδρότητι τῆς σήμερον ἀπολείπεσθαι*[c]. He says this, because though it was the evening, (and the evening of Saturday; properly the beginning of the Sunday; the first day of the quadragesima, as setting in at sunset that evening,) yet the time of supper was still to come; and *then* the people might possibly be guilty of such excesses as he is here deprecating; though they could not be so at the same time the next night, when the Lent fast itself would strictly have begun.

The second homily was delivered under similar circumstances. *Ἤδη οὖν σεαυτὸν ἄξιον παρασκεύασον τῆς σεμνοτάτης νηστείας, μὴ τῇ σημερινῇ μέθῃ τὴν αὔριον διαφθείρῃς ἐγκράτειαν· κακὸς ὁ λογισμὸς πονηρὰ ἡ ἐπίνοια· ἐπειδὴ πέντε ἡμερῶν νηστεία ἡμῖν προκεκήρυκται, σήμερον ἑαυτοὺς τῇ μέθῃ καταβαπτίσωμεν ... ἐὰν γὰρ ἔλθῃς αὔριον οἴνου ἀπόζων καὶ τούτου σεσηπότος, πῶς εἰς νηστείαν σοι τὴν κραιπάλην λογιοῦμαι; .... εὐθὺς ἡ πρώτη τῶν νηστειῶν ἀδόκιμός σοι γενήσεται, διὰ τὸ ἐναπόκεισθαί σοι τῆς μέθης τὰ λείψανα*[d].—*Παρατήρησόν μοι τῶν προσώπων τὴν διαφορὰν, τῶν τε σήμερόν σοι κατὰ τὴν ἑσπέραν φανησομένων* (he does not say *φαινόμενα*, as if the evening were already arrived) *καὶ τῶν αὔριον· σήμερον οἰδοῦντα .. αὔριον δὲ κατεσταλμένα, σεμνὰ*[e], *κ᾽, τ. λ.* —*Ἡ σήμερον ἡμέρα προπύλαιόν ἐστι τῶν νηστειῶν. οὐ δήπου ὁ ἐν τοῖς προθύροις βεβηλωθεὶς ἄξιός ἐστιν εἰσελθεῖν εἰς τὰ ἅγια*[f].

It is clear from all these passages that this homily too was delivered on the eve of the first day of Lent, the evening of Saturday, the eve or vigil of Sunday; that the first of the five days of fasting in the first week of Lent was still to come, but would arrive with the evening of the next day, the eve of Monday; that the rule was consequently to reckon

[c] Opp. ii. 10. B. § 11.
[d] Opp. ii. 12. D. E. § 4.
[e] Ibid. 14. B. § 6.
[f] Ibid. 15. C. D. § 7.

every day in Lent, (and if in Lent every day before and after Lent also,) from the evening; that the principal meal, and that at which there was the greatest danger of excess in eating and drinking, was still future; consequently that its proper time was later than evening or the beginning of the day, and therefore that it was strictly the supper*.

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ix. *Rule of Pamphylia and Lycia.*—Ctesias[g]: Καὶ ὅτι πῦρ ἐστιν ἐγγὺς Φασηλίδος ἐν Λυκίᾳ ἀθάνατον, καὶ ὅτι ἀεὶ καίεται ἐπὶ πέτρας καὶ νύκτα καὶ ἡμέραν. The truth of this fact, for the particular locality of Phaselis on the borders of Pamphylia and Lycia, establishes a common noctidiurnal rule of both those countries.

With regard however to that of Lycia in particular; the philosopher Proclus, who flourished in the fourth or fifth century, was a Lycian. His father and mother were both Lycians; the former Patricius, the latter Marcella: Λύκιοι δὲ οὗτοι ἄμφω[h]. He was brought up from his birth at Xanthus, the principal city of Lycia: Ἄγουσι δὲ αὐτὸν τέως οἱ πατέρες τεχθέντα εἰς τὴν ἑαυτῶν πατρίδα, τὴν ἱερὰν τοῦ Ἀπόλλωνος Ξάνθον[i]. And though he resided subsequently at Constantinople[i], and at Alexandria, and finally came to Athens and settled there for the remainder of his life, before he was twenty years of age[k], and died there at last, at seventy-five years of age[l]; yet as there is no reason to suppose that the rule of

* Gregory of Nyssa too has left an homily *in principium Jejunii*, from which the same kind of inference may be derived: Μὴ ζήτει τῆς ἑβδομάδος τὸ τέλος, ὡς μετὰ χειμῶνα πικρὸν παρουσίαν ἔαρος, μὴ ἐπιθύμει τοῦ σαββάτου τὴν παρουσίαν διὰ μέθην ὡς Ἰουδαῖος . . . μὴ λύπου ὅτι σου ἀπὸ πρώτης ὥρας ἡ οἰκία οὐ καπνίζεται, οὐδὲ ὁ μάγειρος ἕστηκε πρὸς τὸ πῦρ. The exception of both Saturday and Sunday from the quadragesimal fast is thus recognised; and the reckoning of each from the first hour of night, that is from sunset, in the business of preparing for supper, is recognised also. The homily continues in the same strain: Ἐν ἀναισθησίᾳ σπουδάζουσι τὰς ἡμέρας διατελεῖν. ἄχθονται τῷ ἡλίῳ πρὸς τὴν δύσιν βραδύνοντι. μακροτέρας τὰς ἡμέρας τῆς συνηθείας προσαγορεύουσι.

[g] Photius, Bibliotheca, Codex 72. p. 46. l. 34. Ctesiæ Indica. (Bekkeri, Berolini, 1824.)

[h] Marinus, Vita. (Hamburgi, 1618.) Cf. Suidas, Πρόκλος.

[i] Ibid. Cf. Anthologia, iii. 153. Proclus, vi. Πρόκλος ἐγὼ Λύκιος γενόμην γένος κ', τ. λ.: 151. iii. l. 13.

[k] Vita. Cf. Anthologia, iii. 153. Proclus, vi.

[l] Marinus, Vita.

Constantinople, or of Alexandria, or of Athens, was any thing different from that of Xanthus, or this of Xanthus from that of Lycia in general, Proclus' mode of reckoning the night-day may be considered an argument of the Lycian, the Constantinopolitan, the Alexandrine or Egyptian, and the Attic, all at once.

And to these we may add also the Phrygian. For as Marinus, his biographer, has been careful to inform us[1], there was no distinction of days according to any of these calendars, especially the Phrygian and the Egyptian, which Proclus did not attend to, even at Athens, as part of his daily rule of life; and even more strictly than the Phrygians and the Egyptians themselves: Τὰς δὲ Μητρῳακὰς παρὰ Ῥωμαίοις *ἢ καὶ πρότερόν ποτε παρὰ Φρυξὶ σπουδασθείσας ἁγιστείας ἑκάστου μηνὸς ἥγνευε· καὶ τὰς παρ' Αἰγυπτίοις δὲ ἀποφράδας ἐφύλαττε μᾶλλον ἢ αὐτοὶ ἐκεῖνοι· καὶ ἰδικώτερον δέ τινας ἐνήστευεν ἡμέρας ἐξ ἐπιφανείας. πᾶσαν γὰρ ἕνην καὶ νέαν τοῦ μηνὸς μηδὲ προδειπνήσας ἠσίτει· ὥσπερ δὴ τὰς νουμηνίας λαμπρῶς ἐπετέλει καὶ ἱεροπρεπῶς. καὶ τὰς παρὰ πᾶσι δὲ ὡς εἰπεῖν ἐπισήμους ἑορτὰς κατὰ τὰ παρ' ἑκάστοις πάτρια δρῶν ἐνθέσμως διετέλεσε.*

If however this was the common rule and practice of Proclus in every case of the kind, we may very well conclude there was little or no difference in the reckoning of days and nights themselves, in every case of the kind. With respect to the *ἕνη* and *νέα* here mentioned, classical readers do not require to be told it is meant of the last day of the lunar month; the day before the *νουμηνία* or new moon itself, in the calendar reckoning of new moons; though at this period of the history of the calendar at Athens, the former might be understood of the last day and the latter of the first even of the solar month. Proclus' rule it seems was to keep the *ἕνη καὶ νέα* of every month as a *fast*, and the *νουμηνία* as a *feast*. The observable circumstance is that he is said to have kept the former so strictly that he did not vary from his rule, though the day so reckoned might have come upon him even before he had supped; the practical effect of which would be in such cases that he would probably have to fast for the best part of 48 hours instead of 24.

It might be shewn, from the testimony of the Greek ora-

[1] Vita.

tors long before the time of Proclus, that the rule at Athens in general was to sup towards the end of the day; but not always after sunset; so that supper there, if not over at sunset, would be begun at least before sunset in general; that is, it would either be over or at least begun before one day could be said to have ended and another to have begun. Ὁ δὲ, ἐπειδὴ κρίνων αὐτῷ ὁ γεννήσας ἐγένετο, σιτεῖται μὲν ὀψὲ τῆς ἡμέρας ἅπαξ, καὶ τοῦτο τῆς ὥρας ἡλίου λοιπὸν ἀμφὶ δύσιν ἔχοντος [m].—Philosophus Taurus, observes A. Gellius [n] of the custom at Athens in his own time, when he was studying there as a young man, in the reign of Trajan or of Adrian; Philosophus Taurus accipiebat nos Athenis cœna plerumque ad id diei ubi jam vesperaverat: id enim est tempus isthic cœnandi frequens. Ubi jam vesperaverat, *when it was now drawn to evening, when evening might be said to have come on,* yet not necessarily *after* sunset. Proclus' rule, it would seem, was the same as this; to sup towards the end of the day, sometimes so late as to run into the beginning of the next day: and even in this case, his scruples about eating on the ἕνη καὶ νέα were just the same.

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x. *Rule of the modern Greeks.*—Gaza, De Mensibus (written in A. D. 1470), gives us to understand that the rule of the modern Greeks, (of his own contemporaries at least,) was to reckon the day from sunrise [o]. He does not say when, or how, or from what quarter this custom was first introduced among them: but as he also observes that their rule in this respect agreed with that of the modern Romans, or Romans of his own time also, probably he meant only that, as the nearest approach to the Julian rule in their own mode of reckoning the same thing, the modern Greeks had transferred the beginning of the civil νυχθήμερον from sunset to sunrise.

We are able however to prove that this change of the rule among the Greeks of the lower empire must have been comparatively of recent date; and that as low down as A. D. 1079 at least they still reckoned according to the ancient

m Alciphron, Epist. i. xxi.
n Noctes Atticæ, xvii. 8: cf. 20.
o xxi. Uranologium, 310. B: cf. xxi. 311. C.

method. An author is quoted in the Anecdota Parisiensia[p], who furnishes a variety of intimations of the date of his own work[q]: as A.M. 6587: golden number xvi*: solar cycle vii: cycle of Indiction 2: new moon Feb. 5: the moon two days old Feb. 7: the Jewish passover (lunar 14th) Thursday, March 21[r]; Easter Sunday March 24: and the year, in the Julian reckoning, not a leap-year. These criteria meet in A. D. 1079, which must therefore be the year of which they were intended.

Now a quotation follows, which appears to have been taken from the Quæstiones et Responsa of Anastasius Sinaïta[s], (who died in the sixth century;)—*Περὶ τοῦ ποτέρα προτέρα, ἡ ἡμέρα τῆς νυκτὸς ἢ ἡ νὺξ τῆς ἡμέρας*[t]. The answer returned to this is found in terms in the Responsiones of Anastasius[s]: and if it may be supposed, from the place where it stands, to be equally applicable to the time of this writer[s], it proves that the Christian rule of the night-day still agreed with the Jewish; and that as the Jews reckoned their sabbath from sunset on the Friday, so did the Christians their Lord's day from sunset on the Saturday.

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xi. *Rule of the Syrian Christians.*—The modern Syrian rule too is said to agree with that of the modern Greeks †. But the ancient rule of Syria was very different. Nor is any

* In the text once or twice this is erroneously read the xiiith; but 356. 26. we have the right number, xvi.

† Daunou, iii. Leç. i. 43. 44. In the Quæstiones et Responsa, attributed to Justin Martyr[u], it is shewn, from the Gospel accounts, that our Lord was betrayed on the fifth day of the week, not on the fourth; and in order to account for this, (since our Lord in any case was betrayed in the night time,) we must suppose that, according to this author, the night of Thursday in Passion week was reckoned to belong to the *fifth* day, not to the sixth. Such was the rule in Syria, observe the Benedictine editors; to reckon the day and night from morning to morning. This work was certainly not Justin Martyr's. As the author quotes the Syriac version of Ps. xix. 6[x], it is probable he was a Syrian Christian. Yet he must have been later than the 5th century[y].

p i. 352. Ἐκλογαὶ διαφόροι.
q Ib. 354.7. (cf. 352. 21: 353.14–21:) 354. 31: 355. 1. 22–26: 357. 1–9. 10–33: 358. 1—359. 9: 359. 10—360. 13.
r i. 360. 5–13.
s Quæstio lxxxvii. p. 488. Cf. also the note supra, at page 151.
t Anecdota Par. i. 364. 9–24.
u lxv. 465. B—E.
x lxiii. 464. D.
y lxxi. 467, 468. A. lxxiv. 469. A—D.

thing more certain than that the original rule of Syria corresponded to that of the Jews, and to that of Scripture; in other words, to the primitive rule of all mankind. And even at a comparatively recent point of time the old rule was still in force in Syria.

For example, many illustrations of the noctidiurnal rule of Syria occur in the Bibliotheca Orientalis of Asseman; from the fourth and fifth century downwards. As i. in the extract from the Life of Symeon Stylites [z], with reference to the rule at Antioch, mention is made of August 29, hora undecima, sabbato exeunte et dominica ineunte: where we have no occasion to inquire about the year to prove the rule: for if the sabbath was going out and the Lord's day was coming in at the 11th hour of the day, the rule speaks for itself. Again: Monebat enim beatus Symeon ut dominica die unusquisque ab opera vacaret usque ad vesperam: quod et postea obtinuit [a]. Consequently the second day of the week was still dated from the evening of the first. We may have occasion, some time or other, to consider this life of Symeon more in detail. At present we observe merely that its true time is about the middle of the fifth century, or something later.

ii. Æra 807 [b], (the reckoning of which Asseman refers to B. C. 311,) A. D. 496. Jar 17 in the Syrian, May 17 in the Julian, calendar: feria sexta vertente et sabbato ineunte accensis .... such and such a thing occurred. Here too we have no occasion to inquire about the year. If the Friday was going out and the Saturday coming in in the evening, the rule speaks for itself.

iii. Æra 813, A. D. 502 [c], in like manner, mention is made of August 22, illucescente feria sexta. Yet A. D. 502, Dom. lett. F. August 22 was a Thursday: so that this feria sexta must have been reckoned from the evening of Thursday.

iv. Æra 1065 [d], (the beginning of which also is referred to B. C. 311,) A. D. 754, on the 26th of Teschrin Posterior, November 26; we have feria tertia vertente, quarta illu-

[z] i. 212, 213. xvi. Isaac Magnus, Vita per Cosmam, Cod. Syr. i. fol. 69. Cf. 235. 239. cap. xvii.

[a] Ibid. p. 217.

[b] Ibid. 267. xxvi. §. 5. Chronicon of Josue Stylites.

[c] Ibid. i. 272. xxvi. §. v. Chronicon of Josue Stylites.

[d] Ibid. ii. 110. xvi. Dionysius Patriarcha. This author dates from October 1, B. C. 311. See p. 311. de anno 1070.

cescente: and A. D. 754, Dom. lett. F. Nov. 26 was Tuesday. Æra 1076[e] A. D. 765 (Dom. lett. F.) Adar 14= March 14, (Thursday,) we have feria sexta ineunte, feria quinta vergente.

v. A subscription occurs at the end of the work, here noticed[f]: Absolvi hunc librum profundo vespere celeberrimæ diei Pentecostes, anno Græcorum 1542 (A. D. 1231) die decimo mensis Maii. A. D. 1231, Dom. lett. E. gold. numb. xvi. Easter was celebrated on March 23, and Pentecost or Whit-Sunday on May 11. Consequently the eve of Pentecost was the evening of Saturday May 10.

The rule in Syria indeed is illustrated by Gregorius Bar Hebræus, (commonly called Abulpharagius,) Primas Orientis; so far as concerns the state of the case in his own time, which was Æra Græc. 1575. A. D. 1264[g]. Ex his palam fit quod in fine diei feriæ quartæ et feriæ sextæ Syri peculiariter jejunium solvunt[h]. Again: At qui mensibus lunaribus utuntur, Hebræi inquam et Syri et Saraceni, quod vespertinis horis luna nova adpareat noctem *die* priorem faciunt, non quia ante diem nox facta sit[i].

We are not concerned with the reason assigned for the rule, only with the rule itself. It is certain however that the origin of the rule had nothing to do with the use of the lunar instead of the solar reckoning of civil time; and that it was the rule of reckoning the noctidiurnal cycle in numberless instances in which the calendar was solar, and always had been. At this very time the Syrian calendar in particular was solar: and though the Syrian Christians had their lunar computus for ecclesiastical purposes, yet their calendar properly so called was solar, as much as the Julian or the Gregorian at present. Nor do we know on what authority Abulpharagius (himself a Christian) could assert that it was lunar in his time; at least if he was speak-

[e] Ibid. 112.

[f] Ibid. 237. xxxiv. Jacobus Episcopus Tagritensis.

[g] Ibid. 245–321. cap. xlii. cf. ii. 244. 246. 248. 266. He was born Æra Græc. 1537, A. D. 1226, consecrated bishop, Sept. 14, Æra Græc. 1557, consecrated primate, Jan. 16 or 19, Æra Græc. 1575, A. D. 1264, and died July 30, Æra 1597, A.D. 1286. So Asseman.

[h] Ibid. ii. 285. Fundamenta, xii. De Paradiso Eden. E Libro Horrei Mysteriorum, p. 277. 3.

[i] Ibid. Cf. p. 286. Quod autem a nocte, &c.

ing of the Christian calendar of Syria, and not simply of the calendar of the Mahommedans of Syria.

Thus much may suffice for the illustration of the Hellenic rule on the most general scale. We must now proceed to the exemplification of the rule in other instances.

SECTION VI.—*On the Libyan, or ancient African rule.*

Βασουλιεῖς Λίβυες ὅτ᾽ ἂν πολεμῶσι τὰς μὲν νύκτας μάχονται, τὰς δ᾽ ἡμέρας εἰρήνην ἄγουσι.——*Οἱ Νόμαδες τῶν Λιβύων οὐ ταῖς ἡμέραις ἀλλὰ ταῖς νυξὶν αὐτῶν ἀριθμοῦσι τὸν χρόνον* [k]: which last establishes the fact of the use of the primitive rule of the noctidiurnal cycle among the Numidians, and the aboriginal inhabitants of so much of the ancient continent of Africa as went by the name of Numidia, even in the time of Nicolaus of Damascus, a contemporary of Augustus Cæsar.

This Numidian and no doubt common Libyan or African rule may be further illustrated by the testimony of Apuleius.

Apuleius was a native of Madaurus, a city of Libya, belonging to the ancient Numidia or the ancient Gætulia [l]; which he himself describes as formerly a city of Syphax [m], and in his own time a Roman colony. He married a rich widow of Oea, (the modern Tripoli [n];) and there he appears to have settled [o]. We may have occasion hereafter to consider the date of the principal work of his which has descended to posterity, his Metamorphoses, or Fabulæ Milesiæ: and we shall probably see reason to conclude that it must have been composed in A. D. 140; consequently in the reign of Antoninus Pius: and there are intimations even in his other extant works, that he was later than the time of Adrian [p], and must actually have flourished in the reign of Antoninus Pius [q], and in the joint reign of his two successors, Marcus Aurelius and Lucius Verus [r].

The popular rule of Apuleius then must have been the Numidian; and though he himself was a devoted worshipper of the Egyptian goddess Isis, and therefore it might be

[k] Stobæus, Anthologium, *περὶ νόμων καὶ ἐθῶν*. Tit. xliv. 41. *Ἐκ τῶν Νικολάου περὶ ἐθῶν*. Nicolaus Damascenus.

[l] D'Anville, ii. 202. Compendium of Ancient Geography, London, 1810.

[m] De Magia, ii. 27, 28. Florida, 142, E.

[n] D'Anville, ii. 189.

[o] See our Dissertations. App. Diss. xiii. vol. iii. 593–596.

[p] De Magia, ii. 14.

[q] Ibid. ii. 88.

[r] Florida, 123, 124,

supposed would reckon his noctidiurnal cycle by preference, (especially in his Metamorphoses, in which this goddess acts so conspicuous a part,) according to the Egyptian rule; this is no necessary consequence. Men do not so soon forget the associations of their youth, and the customs of the country in which they have been born and brought up: and we should have just as much reason to expect to find Tertullian, another African too, reckoning according to any rule but the African, as Apuleius. Yet Tertullian also, speaking of the Roman Saturnalia, which were notoriously to be reckoned from midnight, observes [s]: Non lavo sub noctem Saturnalibus, ne et noctem et diem perdam. But the truth is, the popular or homeborn rule of Apuleius in this respect, and the Egyptian, were nothing distinct; and he might reckon by either indifferently, and whether for civil or for religious purposes too: for the rule was the same both for social and for religious purposes in both countries.

On the first of the occasions to which we are about to refer, Lucius the hero of his Milesian fables (by whom however he must be understood to mean himself) is at Corinth. But neither did the Corinthian rule, as we have seen, differ from the Egyptian, or from the Numidian. On the night before a certain day, which it appears directly after was known by the name of the Isidis Navigium, Isis addresses him at Corinth in the following terms: Diem qui dies ex ista nocte nascetur æterna mihi consecravit religio [t]: and he himself describes the arrival of another day in a similar manner: Jam dies aderat divino destinatus vadimonio, et sol curvatus intrahebat vesperam [u]. In both instances, the day is supposed to begin at evening; that is, to be reckoned from night. And he dates his arrival at Rome, at last, according to the Roman style indeed, on the day before the Ides of December; yet not according to the Roman style, as reckoning from midnight, but according to the Numidian or the Egyptian, as reckoning from the evening before: Vesperaque, quam dies insequebatur iduum Decembrium, sacrosanctam istam civitatem accedo [x].

[s] Opp. v. 103. Apologeticus, 42.
[t] Metamorphos. xi. 257.
[u] Ibid. xi. 272.
[x] Ibid. xi. 275.

SECTION VII.—*Punic and Tyrian rule.*

Φοινίκων συνθῆκαι· οἱ τὴν Καρχηδόνα κτίσαντες Φοίνικες, ὅτε προσέπλευσαν τῇ Λιβύῃ, ἐδεήθησαν τῶν ἐγχωρίων δέξασθαι αὐτοὺς νύκτα καὶ ἡμέραν· ἐπιτυχόντες δὲ τούτου οὐκ ἐβούλοντο ἀπαλλάσσεσθαι, ὡς συντιθέμενοι (lege *συνθέμενοι*) *νύκτας καὶ ἡμέρας μένειν*[y].

If this piece of history is authentic, and (whether authentic or not) if it is only found upon record, it proves that the Punic rule agreed with the Libyan; and both with the primitive one*. And if such was the Punic rule just before the foundation of Carthage; such must have been the Tyrian also: the founders of Carthage having come to this part of Africa straight from Tyre. And with respect to the Carthaginian rule in particular, we may compare the following from Theodore Metochita[d]: *Καὶ πολλὰ πρὸς τὸ ξενότροπον ἢ κατ' ἄλλους ἀνθρώπους ἐβίουν, οἵ γε κατὰ* (leg. *καὶ τὰ*) *πλεῖστα τῆς*

* Photius indeed adds[z], that the same story was told of the founders of Metapontum, among the Lucani, in Italy: *Τὰ δ' ὅμοια Δήμων ἐπὶ Μεταποντίνων ἱστορεῖ.* Strabo relates the particulars of this tradition, (as it appears,) from Ephorus[a]: *Οἰκιστὴς δὲ τοῦ Μεταποντίου Δαύλιος ὁ Κρίσσης τύραννος γεγένηται τῆς περὶ Δελφούς, ὥς φησιν Ἔφορος. ἔστι δέ τις καὶ τοιοῦτος λόγος· ὡς ὁ πεμφθεὶς ὑπὸ τῶν Ἀχαιῶν ἐπὶ τὸν συνοικισμὸν Λεύκιππος εἴη· χρησάμενος δὲ παρὰ τῶν Ταραντίνων τὸν τόπον εἰς ἡμέραν καὶ νύκτα μὴ ἀποδοίη· μεθ' ἡμέραν μὲν λέγων πρὸς τοὺς ἀπαιτοῦντας ὅτι καὶ εἰς τὴν ἐφεξῆς νύκτα αἰτήσαιτο καὶ λάβοι, νύκτωρ δ' ὅτι καὶ πρὸς τὴν ἑξῆς ἡμέραν*[b].

The same thing might occur in more instances than one; especially in ancient times, when migrations from one quarter of the world to another were so frequent, and the rule of reckoning the day and night was still every where the same. We must infer from the truth of this second story, that the Tarentine, the Achæan, the Delphian, and the Lucanian rules were all the same.

From Livy's account of the sacrifice of the Campani, going on at Hamæ[c] B. C. 215, when they were surprised by the Roman consul Gracchus, we might collect in like manner that the Campanian rule could not have been different from the primitive. This sacrifice was a stated one; and lasted three days. But it was bound to begin each day at *night*, (that is after sunset,) and to be over before midnight.

[y] Photius, Lexicon. Cf. Suidas, *Φοινίκων συνθῆκαι.* Parœmiographi Græci, p. 117, e Cod. Bodleiano, 935. *Φοινίκων συνθῆκαι*: Gaisford, 1836.

[z] Loc. cit.

[a] vi. i. cir. fin.

[b] Cf. also Dionysius Halicarn. Ant. Rom. xvii. 4.

[c] xxiii. 35.

[d] Supplementa ad fragmenta Nicolai Damasceni, p. 96: Cap. ii. De Politia Carthaginiensium. Orellii, Lipsiæ, 1811.

διοικήσεως ταῖς νυξὶν ἐδίδουν, καὶ τὰ βουλευτήρια καὶ τὰς συνόδους ἐπὶ τοῖς πρακτέοις νυκτὸς ἐνόμιζον καὶ μεθ' ἑσπέραν χρῆσθαι. If this was really the case at Carthage, the primitive rule of the noctidiurnal reckoning could nowhere have been reduced to practice more strictly than there.

SECTION VIII.—*Rule of the nations of the north of Europe.*

Galli se omnes ab Dite patre prognatos prædicant, idque ab Druidibus proditum dicunt. ob eam caussam spatia omnis temporis non numero dierum sed noctium finiunt. dies natales et mensium et annorum initia sic observant ut noctem dies subsequatur[e].—Nec dierum numerum, ut nos, sed noctium computant. sic constituunt, sic condicunt; nox ducere diem videtur[f].

What Cæsar asserts of the Gauls in particular Tacitus extends to the Germans in general; that is, to all the nations and tribes of the north of Europe collectively, known to the Romans and distinct from the Gauls and Britons. We may conclude then that this was the original rule of the reckoning of the noctidiurnal cycle of the whole of the north of Europe; as it is said still to be or until lately to have been of the Bohemians, Silesians, Italians, and Austrians[g].

Hence it is, that in the Edda[h], which embodies the primitive traditions and usages of these nations in a variety of shapes, Day or *Dagr* is represented as the son of Night or *Nott;* and in common with Night his mother is supposed to have received it in charge from the Parent of the universe to go round the world in two periods of twelve hours each in length; *Night* taking the lead, mounted on the horse *Hrimfaxi,* (from *hrim,* Anglice rime, the hoar of frost, candied or frozen dew, and *fax* or *faxi* the mane of an horse;) from the drops of whose mane the earth was every morning to be candied over or silvered with *dew;* and *Day* following after her, seated on the horse *Skinfaxi,* (from *skin* to shine, and *faxi* a mane, as before, the horse of the *shining mane,*) by

e Cæsar, De Bello Gallico, vi. 18.

f Tacitus, De Moribus Germanorum, 11.

g Gassendi apud Beveridge, Institutiones Chronologicæ, i. v. § 2. p. 18. Cf. Daunou, iii. Leç. i. 42, 43.

h Icelandica, or Snorroniana. Myth. viii. Cf. however the Edda Antiquior, or Sæmundina, of Arna Magnæus, tom. i. p. 8, 9. xii. xiv. Lexicon Mythologicum, tom. iii. 315 *Dagr:* 441 *Hrimfaxi:* 704 *Skinfaxi.*

which all nature was to be illuminated and powdered with light*.

The testimony of venerable Bede to the Anglo-Saxon rule in particular cannot fail to be interesting to those who are their descendants, and living in the same country, at the present day[l]. Antiqui enim Anglorum populi . . . . juxta cursum lunæ suos menses computavere . . . . incipiebant autem annum ab octavo Kalendarum Januariarum die (Dec[r]. 25.) ubi nunc natale Domini celebramus. et ipsam noctem nunc nobis sacrosanctam tunc gentili vocabulo *Mædre Nech* id est *matrem noctem* adpellabant; ob causam ut suspicamur cæremoniarum quas in ea pervigiles agebant.

This proves that their reckoning of noctidiurnal time, ac-

* In the Bibliotheca of Photius[i] mention is made, and an account is given, of a work, entitled Τῶν ὑπὲρ Θούλην ἀπίστων λόγοι κδʹ: attributed to one Antonius Diogenes. This book contained a story of certain tombs, discovered at Tyre, after the siege of that city and its capture by Alexander the Great: on one of which there was an inscription to this effect:

Μαντινίας Μνάσωνος ἔτη ἐβίω βʹ καὶ μʹ (42) καὶ νύκτας ξʹ καὶ ψʹ (760:)

and on another, the following:

Δερκυλλὶς Μνάσωνος, ἐβίω ἔτη θʹ καὶ λʹ (39) καὶ νύκτας ξʹ καὶ ψʹ (760.)

It is a singular thing that a person of so much judgment and critical sagacity as Photius could have been induced to believe that the author of this work was actually a contemporary of Alexander the Great, or not much later than his time[k]: though his very name of Antonius Diogenes proves him to have lived in the Roman æra and to have been most probably a Roman freed man.

It is clear however that he must have been familiar with the rule of reckoning days and nights *from* the night and *by* the night: and as his work was written professedly about the wonders of Thule, (probably the ancient Scandinavia,) and of the parts beyond it; even this story, found in the work, absurd and improbable as it may be in itself, may be so far an argument of the old noctidiurnal rule of the north. The hero indeed and heroine of his story are this Mantinias and Dercyllis (natives of Tyre, see 109. 27–32. 111. 15.) whose tombs are supposed to have been found at Tyre. But this is no objection: as the history itself was transacted altogether in parts distinct from Tyre.

Ausonius, it cannot be doubted, was a Roman citizen; and U. C. 1132. A. D. 379. even consul ordinarius or eponymus at Rome itself. It might be supposed then, that if any one would follow the Roman rule of reckoning noctidiurnal time from midnight, he would. But he was a native of Burdegalla, that is Bourdeaux, in Gaul: and his native rule was different from the Roman. There is a passage in his extant works which proves

[i] Cod. 166. p. 111. l. 14. [k] p. 112. l. 3.

[l] ii. 81. De Temporum Ratione, xiii.

cording to the calendar, set out from the first night, not from the first day, of their civil year; and we think that they might call this night the mother night, as being the head of the whole succession of nights and days throughout the year, and so far the parent of all the rest; and not for the reason surmised by Bede: or still more probably, in memory of the first night and day itself; and because of the ancient traditional reckoning of all, both nights and days, handed down from the first, from one first and original night. Be this as it may, we exhibit the traces of this old Anglo-Saxon rule in our common phrases of such a day *se'nnight* or such a day *fortnight;* though we no longer reckon the day from the night, as our ancestors did. "They did count time," says Verstegan[m], "by the nights: whereof we yet retain our say-

that he reckoned sometimes in conformity to *this native* rule and not to the Roman; at least in his familiar correspondence, and with his most intimate friends.

1. Condiderat jam solis equos Tartessia Calpe,
Stridebatque freto Titan insignis Ibero:
Jam succedentes quatiebat Luna juvencas,
Vinceret ut tenebras radiis, velut æmula fratris.

Opp. 409. Epist. xix. Pontio Paulino filio.

It continues:—

7. Transierant Idus—medius suprema December
Tempora venturo properabat jungere Jano;
Et nonas decimas ab se nox longa kalendas
Jugiter acciri celebranda ad festa jubebat.

After this in prose:

Nescis puto quid velim tot versibus dicere. medius fidius neque ipse intelligo, tamen suspicor. jam prima nox erat ante diem nonum decimum kalendarum Januariarum, cum redditæ sunt mihi litteræ tuæ.

Now this implies that Ausonius must have reckoned the xix. kal. Jan. (= Dec. 14.) in this instance from the evening of the ides, Dec. 13: otherwise it never could have been said with truth that the ides were already past at sunset. According to the Roman rule, they would not expire until midnight.

§ 27: Hæc ad te breviter, et illico *vesperis illius secuto mane dictavi:* which also is agreeable to the Gallic rule and idiom, but not to the Roman.

There was a full moon, it seems, on the evening of this December 13: and therefore a new moon November 29. Such was the case A. D. 395, as our general lunar calendar shews: from which coincidence we may probably infer that the date of this effusion was A. D. 395, Dec. 13 or 14.

m Restitution of Decayed Intelligence, p. 58. Ed. 1634.

ing of se'nnight and fortnight, for seven nights and fourteen nights; more usually yet so speaking than saying seven days or fourteen days." *

A similar idiom is retained in French — (from the old French at least—) viz. in the phrase "à nuit," which means the same thing as to-day[o].

Section IX.—*Rule of the Arabians.*

We reserve the proper illustration of this rule until the time arrives for giving an account of the Arabian calendar; and of its history from first to last. An opinion has been advanced[p] that the ancient Arabians reckoned their noctidiurnal cycle from noon; and we do not consider it improbable that for astronomical purposes they might do so: but even in this case, as we hope to shew hereafter, this rule must have been borrowed by the Arabian astronomers from the Egyptian. But as to the common or popular rule of the noctidiurnal reckoning among the Arabians; their modern rule of that kind is to reckon from sunset: and it does not appear that the ancient rule ever differed in this respect from the modern. No nation on the face of the earth, excepting the Jews, has persisted so long and so systematically in the observance of one and the same rule of the night-day as the Arabians: and though, from the time of Mahomet, their religion itself may have done much to confirm and retain them in the use of this one rule; it did not introduce

* The poetical Saxon Menologium, given in the Thesaurus of Dr. Hickes[n], with one or two exceptions, in which it reckons by days, marks every interval and every date, all through the calendar, by *nights*.

Thus, setting out from the Circumcision, the eighth day after Christmas-day, Jany. 1, it dates the Baptism (Jany. 6) *five nights* after; the first of February, twenty-six nights after Jany. 6; the Purification, Feby. 2, one night after Feby. 1: and so on; as any one may see, who will take the trouble to follow it from January to December. It is observable too, that this reckoning by nights is to be understood of nights and days; and that the last night always includes the following day; which is properly the calendar date of the corresponding Julian term.

The date of this Menologium is supposed by Dr. Hickes not to come lower down than the beginning of the tenth century. See Thes. p. 221. note.

[n] p. 203. sqq.

[o] Hales' Analysis of Chronology, i. 110. 4to. 1800.

[p] Daunou, iii. Leç. i. p. 44.

the rule. It found it in being, and, as matter of course, it adopted it. The Koran itself prescribes no rule of the noctidiurnal reckoning, no more than Scripture; but it presupposes one as already in being and already in use, to which it gives its sanction; and by the peculiarity of its own injunctions, founded upon it and adapted to it, it renders it perpetual.

Section X.—*Rule of the Umbri.*

We shall now pass to such cases of exception to the universality of the rule which we are investigating, as may be on record, though none such has yet been distinctly produced: and among these, we shall begin with the rule attributed to the Umbri.

According to the authorities quoted supra[q], the Umbri reckoned their noctidiurnal cycle from noon to noon. This statement appears to rest ultimately on the single testimony of Varro, from whom each of our other authorities may be considered to have borrowed it. And though Varro's authority alone, in our opinion, would be sufficient to authenticate the statement, we should still be bound to observe that the statement must have been proposed in a qualified manner even by Varro: that he did not say this was the rule of *all* the Umbri, but of *plerique* merely; of *many* among them no doubt—perhaps of *most* of them; but certainly not of *all.* There must consequently have been another rule in Umbria, even in Varro's time, different from this; and that, for ought which we know to the contrary, might be the primitive rule.

As to the Umbri themselves: They are represented indeed as among the most ancient inhabitants of Italy. Antiquissimus Italiæ populus: says Florus[r] of them. Scymnus of Chios in one instance[s] supposes them the descendants of Latinus the son of Ulysses and Circe; that is of a probably fabulous individual: and even Pliny and others[t] gravely assure us, that they obtained their name from having survived

q Diss. iv. ch. i. sect. iv. p. 139–142.

r i. cap. xvii. § 1. Cf. Dionysius Hal. i. 19. 22. 26: ii. 49. Livy, xix. 33–38. Stephanus Byz. Ὀμβρικοί.

s Geographi Min. ii. Scymnus Chius. p. 14. l. 225.

t H. N. iii. 19. cf. 8. Solinus, ii. § 11. Servius ad Æneid. xii. 753. Isidore, Origines, xiv. 4. 122. A.

the Deluge: Umbri eos (Siculos et Liburnos) expulere: hos Etruria: hanc Galli. Umbrorum gens antiquissima Italiæ existimatur, ut quos Ombrios a Græcis putent dictos, quod inundatione terrarum imbribus superfuissent: but they do not tell us what they were called before they received this name from the Greeks, nor what they called themselves, and in their own language, and whether that was Umbri or not. Servius[u] and Solinus, on the authority of a certain Bocchus (Cornelius Bocchus) or of Mark Antony, make them descendants of the Gauls: and so does Isidore of Seville[x], probably after Servius: in which case their noctidiurnal rule must have agreed originally with the Gallic.

The most probable account of the origin of this people in our opinion is, that they were a colony from abroad. The Lydians, under Atys, according to Herodotus[y], settled among the Ὀμβρικοὶ in Italy: which would so far imply that they claimed some affinity to them. It appears to have been the belief of Theopompus too that they came from Lydia[z]: and also of Scymnus Chius, to judge from his testimony in another instance[a]:

> *Μεσαίτατον δ' οἰκοῦσιν Ὀμβρικοὶ λεὼ,*
> *οὓς φασιν ἁβροδίαιτον αἱρεῖσθαι βίον,*
> *Λυδοῖσι βιοτεύοντας ἐμφερέστατα.*

Now, though we have no positive testimony to the ancient noctidiurnal rule of Lydia; yet as we have ascertained on good grounds that the Lydian calendar was altogether the same with the Phrygian, (that is, one was the same modification of the primitive calendar as the other,) and as we have also had sufficient reason to conclude that the Phrygian rule of the nightday never varied in the slightest degree from the primitive one; we think ourselves justified in assuming the same thing of the Lydian: and therefore in drawing the inference that, if the Umbrians were truly a colony from Lydia, their rule of the noctidiurnal cycle originally could not have differed from the Lydian.

But we are more inclined to trace the origin of the Umbrians of Italy to ancient Egypt. For tradition has perpetuated

u Ad Æneid. xii. 753. Cf. Solinus, ii. § 11.
x Origines, ix. 2. 75. E.
y i. 94.
z Apud Athenæum, xii. 32.
a Geographi Min. ii. p. 22. l. 365.

the fact of the settlement of an Egyptian colony even in Italy, and at a remote period in point of time. We cannot however enter on the proofs of this opinion here; though we hope to be able to produce them hereafter. We have already observed[b] that the rule of reckoning the noctidiurnal cycle, from noon, so characteristic of astronomers every where, was nevertheless first introduced by the astronomers of Egypt. We have only to suppose it was brought into Italy by this colony which settled there and received the name of Umbrians; and we shall account for the tradition, connected with their rule, at once. This rule, as we have observed, is most characteristic of the astronomers: and we should be entirely of opinion that even among the Umbrians the use of the rule was restricted to astrological purposes, or to what would then be considered scientific and astronomical ones: and this is probably the reason why, as characterized by the use of such a rule, they are styled if not by Lydus yet by the Auctor Anonymus, Ἔθνος ἀστρολόγον. Servius[c] extended the use of the same rule to the Etrurians: and these were such near neighbours of the Umbrians, that if they had not previously devised the same rule for themselves, they might easily have learnt it from them. Trecenta eorum oppida, continued Pliny loc. cit. Thusci debellasse reperiuntur. We are persuaded however, that the use of this rule even among the Etrurians was just for the same purposes as among the Umbri; that is, purely astrological, purely apotelesmatical or genethliacal—or if we will, astronomical—such as the astronomy of that day in Italy may be supposed to have been.

SECTION XI.—*On the Chaldean or Babylonian rule.*

The Chaldean or Babylonian rule, we were told[d], was to reckon the noctidiurnal cycle from sunrise; and we see no reason why the truth of this statement in general should be called in question. Yet we have met with nothing calculated to illustrate it, except the following passage of the Νεκυομάντεια of Lucian[e]: in which he is speaking of a Chaldean astrologer, and of his mode of proceeding on a certain occa-

[b] Diss. iv. ch. ii. sect. iii. p. 159. [c] Supra, Diss. iv. ch. i. sect. iv. p. 140.
[d] Ibid. ch. i. sect. iv. [e] Opp. i. 465. 7. 56.

sion; from the nature of which it may be presumed it would be altogether *secundum artem,* and according to rule and precept.

Παραλαβὼν δέ με ὁ ἀνὴρ πρῶτα μὲν ἡμέρας ἐννέα καὶ εἴκοσιν ἅμα τῇ σελήνῃ ἀρξάμενος ἔλουε, κατάγων ἐπὶ τὸν Εὐφράτην ἕωθεν, πρὸς ἀνατέλλοντα τὸν ἥλιον ῥῆσίν τινα μακρὰν ἐπιλέγων. κ̀, τ. λ.*

This may be considered an argument that for such purposes as these the day was reckoned from sunrise†.

Notwithstanding this, we are entirely of opinion that the Babylonian rule did not differ originally from the primitive. There would be every reason to suppose this, even had we no proof to offer of the fact itself: for if there was an original rule of the noctidiurnal cycle, where was it so likely to be retained from the first as in Chaldæa? where, in the ancient world, was the reckoning of the cycle of day and night more strictly attended to, or where was more importance attached to it, than in Chaldæa, the birthplace of astrology? But in fact the Babylonian dates which occur so often in the Magna Compositio of Ptolemy, from the epoch of the æra of Nabonassar (that is, from B. C. 747) downwards, and are so

* There is a peculiarity in the allusion to 29 days, reckoned from the new moon, which is strikingly characteristic of the accuracy of Lucian in such circumstances of his representations as these; fictitious as they are in other respects. The Chaldees had a lunar calendar in his time regulated by the Apis cycle: but it bore date on the luna 2ª, not on the luna 1ª. One of their months then reckoned *κατὰ σελήνην* would contain only 29 days.

† In Marinus' Life of Proclus, there is an allusion to his observance of the Chaldaic rule of ablutions or purifications; as well as of a different one, which he calls the Orphic: *Καὶ ταῦτα πράττων ἑκάστοτε ἀφ' ὧν τὸ χαρίζεσθαι συμβαίνει τῇ ψυχῇ. νύκτωρ τε καὶ μεθ' ἡμέραν ἀποτροπαῖς καὶ περιρραντηρίοις καὶ τοῖς ἄλλοις καθαρμοῖς χρώμενος ὅτε μὲν 'Ορφικοῖς ὅτε δὲ Χαλδαϊκοῖς, ἐπὶ θάλατταν δὲ ἀόκνως ἑκάστου μηνὸς κατιὼν, ἔσθ' ὅτε δὲ δὶς καὶ τρὶς τοῦ αὐτοῦ.*

The Orphic rule would require such observances by *night* or at evening: and to them the *νύκτωρ* must be referred. If so *μεθ' ἡμέραν* must be referred to the Chaldaic, as requiring the same thing to be done by day, or in the morning. As to his monthly bathings, even had those been restricted to one day of the month, the calendar *νουμηνία*—yet the relation of calendars one to another even in his time would still be such as to require him to bathe, though nominally on the same day (the first of the month), yet two or three times or oftener, in the course of a given month.

regularly identified with the Egyptian for the time being all along, can leave no reasonable doubt that at the epoch of this æra, and ever after too, the Babylonian rule of the noctidiurnal reckoning and the Egyptian could not have differed. Every Babylonian observation, reported by Hipparchus or Ptolemy in terms of the Egyptian calendar, is decisive on that point.

If then the Chaldeans or Babylonians had also a different rule, it must have been an innovation on this; and yet it never could have superseded it. It might be in existence after a time along with it; but it could not be older than it; and if it was coexistent along with it, it must have been used for a different purpose. A reason too may be probably assigned for the innovation itself as far as it was intended to go; but it would be premature to enter upon it at present.

SECTION XII.—*On the Persian rule.*

The Persian rule of the reckoning of the noctidiurnal cycle differed from the primitive, and agreed with the Babylonian; and though, as far as the former is concerned, this statement rests only on the authority of Servius [f], who is much too late to establish the Persian rule of any but his own time; we are willing to receive it as true even of the ancient Persian rule, at least from a certain point of time downwards.

There is not indeed any express testimony to the Persian rule of antiquity in this respect, to which we could appeal, unless it be that which is contained by implication in the fact witnessed by the prophet Ezekiel [g], B. C. 593, of the Jewish worshippers of the Persian Mithras; the time of which act of adoration, and consequently of idolatry, on their part, there is every reason from the circumstances of this whole description to collect must have been precisely the moment of sunrise. The importance of this chapter of the prophecy of Ezekiel for the illustration of three or four of the calendars of antiquity, (all contemporaneously in existence,) no commentator has yet suspected; but we ourselves, if God permit, hope in due time to shew. Tertullian however will give us to understand that in his time the article of sunrise was the proper time of the day to adore the sun as

[f] Diss. iv. ch. i. sect. iv. p. 140. [g] viii. 15—17.

the proper object of Persian idolatry[h]: Ad Persas si forte deputabimur : licet solem non in linteo depictum adoremus, habentes ipsum ubique in suo clypeo, (his own orb or disk;) denique inde suspicor quod innotuerit nos ad orientis regionem precari. sed et plerique vestrum, affectatione aliquando et cœlestia adorandi, ad solis ortum labia vibratis.

There are facts on record, from the time of Darius Hystaspis, B. C. 522, downwards, which shew that the Persians must have attached greater importance to sunrise than to any other epoch of the natural day or natural night. Thus: the agreement of the seven Persian noblemen, after the destruction of the two Magian usurpers, to meet at sunrise the next morning, and at that time to determine which should be chosen king: Ὅτευ ἂν ὁ ἵππος ἡλίου ἐπανατέλλοντος πρῶτος φθέγξηται[i].—Ὡς τῆς ἐπιούσης ἡμέρης ὁ ἀγὼν ἡμῖν ἔστι[k].—Ἅμ' ἡμέρῃ δὲ διαφαυσκούσῃ[l].—Ὡς δὲ ἅμα τῷ ἡλίῳ ἀνιόντι[m]. The time chosen by Xerxes, B. C. 480, for the passage of the Hellespont[n]: the ceremonies before the last battle at Thermopylæ[o]: and the close of proceedings there afterwards[p], all suggest the same inference.

Q. Curtius, describing the march of Darius from Babylon to the Euphrates to encounter Alexander at Issus, supposes it to begin at sunrise[q]: Patrio more Persarum traditum est orto sole demum procedere. die jam inlustri signum e tabernaculo regis buccina dabatur. super tabernaculum, unde ab omnibus conspici posset, imago solis crystallo inclusa fulgebat. Of the meeting of Artabanus, king of Parthia, and Macrinus, after the death of Antoninus Caracalla, A. D. 217, Herodian observes[r]: Ἅμα δὲ ἡλίῳ ἀνίσχοντι ἐφάνη ὁ Ἀρτάβανος· ἀσπασάμενοι δὲ τὸν ἥλιον, ὡς ἔθος αὐτοῖς, οἱ βάρβαροι,

[h] Opp. v. 45: Apologeticus, 16. Cf. 154: Ad nationes, ii. 13.

[i] Herod. iii. 84.

[k] Ib. 85.

[l] Ib. 86. Cf. Justin, i. x. § 4—8: Photius, Bibl. Codex 72: Ctesiæ Persica, p. 38. l. 34.

[m] Ibid. 87. The horse was sacred to the sun in Persia:—

Placat equo Persis radiis Hyperiona cinctum;
Ne detur celeri victima tarda deo.

Ovid. Fasti i. 385. Cf. Justin. loc. cit: Heliodori Æthiopica, x. 6. The neighing of an horse on the first appearance of the sun in the morning would naturally be construed as his proper mode of adoring the sun; or as the proper act of salutation on his part of his proper lord and master, the sun.

[n] Herod. vii. 54.

[o] Ib. 223.

[p] viii. 23.

[q] Lib. iii. cap. iii. § 8: cf. § 11. And Lib. iii. cap. ii. § 3.

[r] Ib. iv. 30.

κ', τ. λ. And Procopius tells us[s] it was the practice of the Magi to do this (salute or adore the sun) at sunrise every day: Εἶναι γὰρ αὐτοῖς νόμον τὰς τοῦ ἡλίου ἀνατολὰς προσκυνεῖν ἡμέρᾳ ἑκάστῃ.

In strictness however, this custom proves in the first place only that the sun was an object of worship in Persia. By implication and secondarily it may also be an argument that the noctidiurnal cycle itself was probably reckoned from sunrise. But it does not follow even in this case, that the day so reckoned must have been the civil day, and not merely the religious or liturgical one; or that the whole *νυχθήμερον* was necessarily reckoned from this one epoch of sunrise, because greater respect was paid to sunrise than to sunset. Tacitus mentions that during the battle of Cremona, A. D. 69, (which lasted two days[t], October 17—19,) the soldiers of one of the Roman legions, which had served a long time in Syria, and had only just come from thence, on the morning of the last day saluted the rising sun, after the custom of that country[u]: and by that accident decided the contest in favour of their own party, which was that of Vespasian: Undique clamor: et orientem solem (ita in Syria mos est) tertiani salutavere. Yet what truth would there be in inferring from this fact, that even in Syria at this time, much less among the Romans themselves, noctidiurnal time was reckoned from sunrise?

We are willing notwithstanding to admit that after a time this mode of reckoning the noctidiurnal cycle was received into use in Persia: and that so far, and from this time forward, the Persian rule must be regarded as an exception to the general one. Still we may contend that, even in this case, the exception confirms instead of invalidating the primitive rule. It was an innovation upon this primitive rule; of which, (as we shall see, we trust, hereafter,) both the motive and the date may probably be assigned *.

* When Procopius is giving an account of a famous crown-jewel of the kings of Persia, (a pearl of uncommon size and beauty,) lost by Perozes, the Persian king, in the same battle with the Ephthalite Huns in which he lost his life also[x]; This pearl, says he, was guarded by a dog-fish of pro-

[s] De Pello Persico, i. cap. 3. 19. l. 2. (Bonnæ, 1833.)

[t] Historiarum, iii. 16—19: 21, 22: 23, 24.

[u] Ib. iii. 24. Cf. Xiphilinus (Dio) lxv. 14.

[x] De Bello Persico, i. cap. 4. 22—26: 24. 11.

To judge from the practice of the Parsees of Kerman (Carmania) and Surate, the modern disciples of Zoroaster, the professors of Magianism and worshippers of fire at the present day, of whom this rule is still characteristic; it must always have been connected with the religious belief and observances of the ancient Persians. It must have been their ecclesiastical or ritual rule; it could not have been that of daily life. Traces of the primitive rule may be discovered even in the Zendavesta, the sacred books of these Parsees, and the reputed works of Zoroaster or Zerdusht himself; at least if reliance may be placed on those books of the Parsees, which have been translated under the name of the Zendavesta by Anquetil du Perron, as the genuine works of Zoroaster transmitted to the present day. There are many passages in this collection of his rules and precepts, (especially in the Vendidad, and its various Fargards, which are reckoned the twentieth Niosk, Part or Division, of the Zendavesta itself,) from which it must be inferred that even in the time of Zoroaster (B. C. 589—513, according to Du Perron) the day was still reckoned from the night, and not the night from the day. It would be tedious to enumerate instances of this idiom; so frequent of occurrence is it. Let one example suffice. Where the thing intended is a prayer or good wish, the most intense of its kind, the words are, "May your soul live night and day," (not day and night,) that is, for ever.

Still there are also passages in the Zendavesta, in which a different idiom and a different association of ideas appear. But these are comparatively few. It is not certain that they are genuine. They occur in doubtful parts of the collection; which is not free from interpolations. In one of the books received by the Parsees, (not indeed as a part of the Zendavesta, though considered to teach the same doctrine as

digious size and fierceness, which was so jealous of it as to be always following and always watching it *night and day*: οὔτε νύκτα ἀνιέντα οὔτε ἡμέραν. No doubt such was the story told by the Persians themselves of this jewel: yet the order of these ideas, night and day, not day and night, is just the same as might have occurred to any Greek: and that too as late as the reign of the Persian king Perozes, a contemporary of the Greek emperor Zeno[z].

[z] See i. cap. 3. p. 16. l. 21.

that,) a work entitled the "Boundehesch," which serves at present as the Text Book of the Parsee cosmogony; a direction occurs in so many words, that night was to be reckoned from day [a]: "Il faut compter premièrement le jour et ensuite la nuit: parceque le jour a été d'abord, la nuit est venue ensuite." But this work is modern in comparison of the age of Zoroaster, even the latest which can be assigned him. Its own evidence proves that it cannot be of an earlier date than that of the Gelalæan correction, A. D. 1079: if so early.

SECTION XIII.—*On the Roman rule.*

All our testimonies are agreed that at Rome the noctidiurnal cycle was reckoned from midnight. This rule was much older than the Julian correction. It passed into the Julian calendar of Cæsar from the more ancient Roman calendar: and through the Julian correction of the dictator Cæsar it has passed almost universally into the civil calendar of modern Europe; so as to make it one of the most invariable and of the best known distinctions of the civil reckoning of noctidiurnal time, both public and private, both legal and ecclesiastical, in conformity to the Julian rule, that the noctidiurnal cycle, or period of 24 hours, is dated thereby perpetually from midnight.

It may very well be questioned however whether, in the first instance of all, and while it was strictly confined to the Roman calendar, only as one in particular among the almost innumerable calendars of antiquity in general, this rule was any thing but a legal and juridical, or a religious and ritual one. The rule of the common people everywhere, as Pliny observed, was in direct conformity to that of nature, *a luce ad tenebras, a tenebris ad lucem:* and it is certain that, not only after the Romans had got the sundial among them, and with it something like a regular division of the hours of day and of night*, but long before too, this must have been the

* The division of the noctidiurnal cycle into two equal or apparently equal halves, one of them dated from sunset and the other from sunrise, and the subdivision of each of these into *twelve* smaller parts called *hours*, are very different things. The former is made by nature, but not the

[a] Zendavesta, ii. 400. xxv.

popular mode of distinguishing and reckoning the day and the night at Rome.

A. Gellius informs us from Varro[b], Senatus consultum ante exortum aut post occasum solem factum ratum non

latter. There are sensible physical distinctions between the former; but there are no physical marks or criteria to separate the latter one from another, and to discriminate the parts of each. The former too is more indispensable to the wants of society than the latter. Experience has proved that men could make shift without the subdivision of night and day into hours; but they could never for a moment have dispensed with the distinction of night and day.

It may very well consequently admit of a question whether mankind were acquainted with the division of noctidiurnal time into hours from the first, or not; whether they were put in possession of it by their Creator, or were left to find out its necessity and to contrive the means of making it for themselves; whether the earliest division of the noctidiurnal cycle in this manner everywhere was into temporary and variable hours, or whether the secret of mean time also was known and possessed from the first. On these points we have no information vouchsafed in Scripture: every one therefore must form his opinion for himself. We have always considered it most probable and most becoming to suppose that all useful knowledge of which men stood in need, was communicated to them by their benevolent Creator, as to his rational creatures, from the first; and that though abundantly supplied with sensibilities, and powers, and capacities, both to find out all their wants, and to devise the means of supplying them too in due course of time; they were not left in reality ignorant of any thing which it behoved them to know, nor destitute of any thing which it was necessary that they should possess. We shall have opportunities however, it may be, of recurring to this subject, where facts are passing under our consideration which cannot well be explained on any other hypothesis.

But though it should be admitted that the subdivision of the noctidiurnal cycle into hours was known to the first pair of mankind, and to their descendants, it must also be admitted that in the course of time it was forgotten and lost in repeated instances, and had to be recovered by men for themselves. That one such article of the knowledge, born with man and an instinct of his nature at first rather than an acquisition, should have been lost sometime or other afterwards, will not surprise us, when we consider how many other truths, once known to mankind, and in the surest and clearest manner, and much more important than this, (such as the knowledge of their Creator, of their own origin, and of that of the world in which they were placed,) were afterwards lost also, and never recovered by men for themselves, nor known again until it pleased God to communicate them afresh by a direct revelation from himself. And in this particular instance of the recovery of the division of the noctidiurnal cycle

b Noctes Atticæ, xiv. 7.

fuisse. Why was that, if sunrise and sunset were not considered one the beginning, and the other the end, of the day at Rome? Sol occasus suprema tempestas esto[c], is one of the best known of the laws which made a part of the xii. Ta-

into hours of kairic or mean time; the length of time which it took to effect it, the many tedious experiments which had to be tried in order to elaborate it, the rudeness and imperfection of successive means employed for the purpose, and the practical inconvenience which must have been felt from the absence of so useful a division of time, while this tentative and abortive process was going on; may serve to convince us not only of the great necessity of the division itself to the practical wants of society, but also how long, in all probability, it must have been before men would have succeeded in excogitating it for themselves, had they not been put in possession of it by their Maker himself from the first. Every good and perfect gift is from above, and always was so. All truth and all knowledge, worthy of the Creator to give and of his creatures to receive, is an emanation from the Father of lights: nor can we persuade ourselves to believe that the minds of the two most perfect of his creatures, (little if at all inferior to angels as they came from the hands of their Maker,) were not stored with the knowledge of angels too; or that God, who communicated to them from the moment of their existence so full and complete a knowledge of himself, would withhold from them any really necessary and suitable knowledge of a different kind, but infinitely less to be valued, infinitely less necessary, than that.

With regard to the Romans, and to the time when the division of day and night into hours appears to have become general among them, testimony is certainly consistent in assigning it the same date: but this date is so late in their history that we may reasonably be excused for suspecting the existence of some mystery on this point, which has never been cleared up, and probably never will be. It is scarcely conceivable that the division of noctidiurnal time into hours should not have been known to some of the nations of ancient Italy, particularly to the Umbrians and the Etrurians; and if known to any, especially to their neighbours the Etrurians, it could scarcely have been unknown to the ancient Romans. The science and skill embodied in the calendar of Numa Pompilius are scarcely compatible with such a supposition. The peculiar rule of the cycle itself among the Romans, (the institution of which we do not hesitate to ascribe to him,) from midnight to midnight, was founded on no sensible distinction like sunrise, or sunset, or noon; and therefore supposes some other of a positive and artificial kind, more accurate possibly than such sensible distinctions themselves. It is manifest that if this *is* the rule of the liturgical or religious day, and of the juridical or civil, it ought to be capable of

c Varro, De Lingua Latina, v. p. 52. vi. p. 91: A. Gellius, xvii. 2: Festus, xvii. 550. 5. Suppremum, (Dacierii, in usum Delphini, 1700.): Censorinus, De Die Natali, xxiv.

bles: and though it might be intended in the first instance of the juridical day, that makes no difference. It was borrowed from the code of Solon: and at Athens "the sun on the mountains" defined and declared the end both of the

being accurately defined above all others. Had the Romans too even been destitute of the means of measuring the parts of the day and the night down to the time of the mission of the decemvirs into Greece, yet if they found both the clepsydra and the sundial in actual use at Athens, is it not natural to suppose they would bring the former at least back with them to Rome? And yet the date of the actual introduction of the water-clock at Rome, if Pliny[d] and Censorinus[e] are to be believed, was not earlier than B. C. 159. This visit of the decemvirs to Greece indeed has been doubted by learned men. But it will be seen hereafter, we trust, that it is attested and authenticated by the Roman calendar itself. The decemviral correction of the calendar of Numa is to be traced up to it. Learned men have never been aware of these facts, or they would have *doubted* of their own *doubts;* and have seen the absurdity of refusing credit to the unanimous testimony of Roman antiquity (which with one voice deposes to the fact of this visit) merely because of certain vague surmises of their own.

These observations may induce us to suspect that from the time of Numa downwards the Pontifical College at Rome were possessed of some knowledge on this point, which they carefully kept to themselves. For some hundreds of years after the correction of the calendar by Numa, its administration was so exclusively reserved to the pontiffs, that the people did not know what days were *fasti* and what days were *nefasti;* or *when* they were to look for a *new moon,* according to the calendar; except as they were told by the priests: and though the calendar, or Fasti as they were called, was made public by Cn. Flavius, in B. C. 304—and without the consent of the priests, yet if there was any secret relating to the division of the noctidiurnal cycle, known to them but not to the people, that at least was not divulged at the same time.

Let us hear however what the most learned of the Romans have left on record, relating to this point.

Speaking of the division of hours among the Greeks first, and afterwards at Rome, Pliny observes[f]: Serius etiam hoc Romæ contigit. duodecim tabulis ortus tantum et occasus nominantur: post aliquot annos adjectus est et meridies; accenso consulum id pronuntiante, quum a Curia inter Rostra et Græcostasim prospexisset solem. a columna Mænia ad Carcerem inclinato sidere supremam pronuntiabat. sed hoc serenis tantum diebus, usque ad primum Punicum bellum.

Princeps Romanis solarium horologium statuisse ante undecim (lege decem) annos quam cum Pyrrho bellatum est (B. C. 283 + 10 = 293; cf. Liv. x. 46; *infra,* it is B.C. 263 + 30 = 293) ad ædem Quirini L. Papirius Cursor, quum eam dedicaret a patre suo votam, a Fabio Vestale proditur. sed

[d] H. N. vii. 60. [e] De Die Natali, xxiii. [f] H. N. vii. 60.

legal and of the ordinary day. Wheresoever this simple and obvious because natural division of the noctidiurnal cycle prevailed, there for the purposes of common life general consent and popular concurrence had established a rule of its own.

neque facti horologii rationem vel artificem significat, nec unde translatum sit aut apud quem scriptum id invenerit.

M. Varro primum statutum in publico secundum Rostra in Columna tradit bello Punico primo a M. Valerio Messala Consule (U. C. 491. B. C. 263) Catina capta in Sicilia: deportatum inde post XXX annos quam de Papiriano horologio traditur anno urbis CCCCLXXXXI. nec congruebant ad horas ejus lineæ: paruerunt tamen eis annis undecentum, (99,) donec Q. Marcius Philippus, qui cum L. Paullo fuit censor, diligentius ordinatum juxta posuit: (U. C. 590. B. C. 164:) idque munus inter censoria opera gratissime acceptum est. etiam tum tamen nubilo incertæ fuere horæ, usque ad proximum lustrum. tunc Scipio Nasica collega Lænatis primus aqua divisit horas æque noctium ac dierum: idque horologium sub tecto dicavit anno urbis DXCV. (595. B. C. 159:) tamdiu populo Romano indiscreta lux fuit.

Varro[f]: Suprema (tempestas) summum diei: id a supremo. hoc tempus duodecim tabulæ dicunt Occasum esse solis: sed postea Lex Prætoria (*lege* Plætoria) id quoque tempus jubet esse supremum, quo Prætor in comitio supremum pronuntiavit populo.—Adcensum solitum ciere Bœotia ostendit.. hoc versu, Ubi primum adcensus clamavit meridiem. hoc idem Cosconius in actionibus scribit, prætorem adcensum solitum esse jubere, ubi ei videbatur horam esse tertiam, inclamare horam esse tertiam, itemque meridiem, et horam nonam[g].

A. Gellius[h]: (From the Bœotia, the same play referred to by Varro—a disputed play of Plautus, but in A. Gellius' opinion, genuine;)

Ut illum dî perdant primus qui horas repperit,
Quique adeo primus statuit hic solarium,
Qui mihi comminuit misero articulatim diem.

Censorinus[i]: In horas duodecim divisum esse diem noctemque in totidem vulgo notum est. sed hoc credo Romæ post reperta solaria observatum: quorum antiquissimum quod fuerit, inventu difficile est. alii enim apud ædem Quirini primum statutum dicunt: alii in Capitolio: nonnulli ad ædem Dianæ in Aventino. illud satis constat; nullum in foro prius fuisse quam id quod M. Valerius ex Sicilia advectum ad rostra in columna posuit. quod quum ad clima Siciliæ descriptum ad horas Romæ non conveniret; L. Philippus Censor aliud juxta constituit. deinde aliquanto post P. Cornelius Nasica Censor ex aqua fecit horarium, quod et ipsum ex consuetudine noscendi a sole horas *solarium* cœptum vocari.

Horarum nomen non minus annos CCC. Romæ ignoratum esse credibile est. nam in XII Tabulis nusquam nominatas horas invenias, ut in aliis postea legibus, sed ANTE MERIDIEM, eo videlicet quod partes diei bifa-

f De Lingua Latina, v. p. 52. g v. 75. h iii. 3. i De Die, xxiii.

Sacerdotes Romani, observed Pliny[n], et qui diem diffiniere civilem .... a media nocte in mediam (diem) observant. He limits this mode of reckoning the noctidiurnal cycle to the priests and to the jurisconsulti; i. e. to religion, and to the courts of law: and such we apprehend was the real state of the case: That the Romans had always two modes of reckoning the day, one which agreed with the primitive, from evening to morning and morning to evening, and was permitted at least by the law while it did not interfere with legal or religious purposes; and another, prescribed by the law for the courts of justice, and for the offices and services

riam tum divisi meridies discernebat. alii diem quadripartito, sed et noctem similiter, dividebant: idque similitudo testatur militaris, ubi dicitur *vigilia prima*, item *secunda* et *tertia* et *quarta*.

Tunc *meridies*[j]; quod est medii diei nomen. inde *de meridie*. hinc *suprema*: quamvis plurimi *supremam* post occasum solis esse existimant, quia est in xii Tabulis scriptum sic: SOL. OCCASUS. SUPREMA. TEMPESTAS. ESTO. sed postea M. Plætorius Tribunus plebis scitum tulit in quo scriptum est: PRÆTOR. URBANUS. QUI. NUNC. EST. QUIQUE. POSTHAC. FUAT. DUOS. LICTORES. APUD. SE. HABETO. ISQUE. USQUE. AD. SUPREMAM. JUS. INTER. CIVES. DICITO.

Post supremam sequitur *vespera*, ante ortum scilicet ejus stellæ quam Plautus *vesperuginem*, Ennius *vesperum*, Virgilius *Hesperon* adpellant[k].

Pliny[l] tells of an obelisk, brought from Egypt in the reign of Augustus, and set up in the Campus Martius, to serve as a sundial; and regulated, in the first instance, for noon, or the sixth hour, at the winter solstice: Brumæ confectæ die, hora sexta. hæc observatio, he continues, triginta jam fere annis non congruit: which, referred to the date of his work, A. D. 76, would be from A. D. 46. He suspects that the foundation had given way; but the irregular administration of the calendar might have something to do with it.

Lastly, we may collect from Tertullian, that it was still the custom in his time to give public notice of these three hours in the day; the third, the sixth, and the ninth: and that this was one reason why they had been fixed upon by the Christians as hours of prayer also: Tamen tres istas horas, ut insigniores in rebus humanis, quæ diem distribuunt, quæ negotia distinguunt, quæ publice resonant, ita et sollemniores fuisse in orationibus diurnis[m].

The first of these in the classical idiom is meant by the ἀγορὰ πληθύουσα or πλήθουσα, the ἀγορᾶς πληθώρα, of the Greeks. Cf. Pliny, H. N. x. iv. p. 18: Athenæus, vi. 99: Photii Lexicon, Περὶ πλήθουσαν ἀγοράν.

j De Die, xxiv.

k Cf. Macrobius Saturnalia, i—iii. p. 209.

l H. N. xxxvi. 16. 667–670.

m Opp. ii. 408. Adv. Psychicos, 10. Cf. iv. 23. De Oratione, 25.

n Diss. iv. ch. i. sect. iv. 140.

of religion, and for public purposes in general, from midnight to midnight.

Plutarch has much to say on this particular question[o], why the beginning of day was reckoned among the Romans from the middle of night? And his making it a question at all is one among other proofs that the Grecian rule, with which he himself was most familiar, must have been very different from the Roman. There is a passage in Festus which leads to the inference that among the ancient Romans the rule was otherwise. Æquidiale apud antiquos dictum est quod nunc dicimus æquinoctiale, quia nox diei potius quam dies nocti adnumerari debet: Græci quoque in hoc consentiunt, *ἰσημερίαν,* id est æquidiale, dicentes[p]. This means that what the Romans of his day called *æquinoctiale,* those of former times called *æquidiale:* but the reason assigned for the distinction applies to the modern idiom in this case, that of his own time. The Romans of his day called the equinox Æquinoctiale, because in their opinion the night was to be reckoned to the day. If so, the Romans of former times must have called it Æquidiale, because in their opinion the day was to be reckoned to the night. If the former mode of speaking, so explained, would imply that the day took precedence of the night; the latter on the same principle must intimate that the night took precedence of the day. This was therefore the state of the case at first, among even the Romans themselves; that night was thought to precede the day and not day the night: and what was that but the primitive idea of the relation between them, and the primitive rule of the noctidiurnal reckoning founded upon it?*

* Servius, ad Æneid. vi. 224. Facem: Per noctem autem urebantur: unde et permansit ut mortuos faces antecedant.—Ibid. ad 255,

Ecce autem primi sub lumina solis et ortus:—Atque hæc sacra per noctem fiebant, ut dicunt. sed locutus est secundum Romanum ritum, quo dies creditur a medio noctis incipere.

This too is an argument that even among the Romans originally the day was reckoned from the night. Men have never been more scrupulous and more tenacious about the observance of the proper rule of the noctidiurnal cycle, than where funeral ceremonies and the last offices in behalf of the dead were concerned.

[o] Quæstiones Romanæ, lxxxiv.

[p] Festus, i. 15. 4.

SECTION XIV.—*On the Chinese, Indian, and Spanish American rule.*

Omnes orientales nationes, observes Scaliger[o], Indi, Sinæ, Chataii, veteres Assyrii, Syri, Chaldæi, Arabes, Damasceni, calculum lunæ a meridie instituunt, diem civilem autem a sole occaso. What is here asserted of the moon, so far as we know, rests on no certain foundation, except it be the particular rule of the modern Jewish calendar; if even on that. But with respect to the noctidiurnal rule of all these nations, there is every foundation in the matter of fact for what is asserted; though the modern practice in some of these instances has come to vary from the ancient.

The civil day of the Chinese at present appears to be reckoned from midnight, or rather from one of our hours before midnight: a very singular distinction, the mere statement of which is enough to imply that there must have been some extraordinary reason for it: as indeed we hope to shew ere long there was. Yet Daunou asserts the old rule of them still[p]. The Siamese at least continue to reckon the day from sunset. The Indian or Hindu rule at present is to date the noctidiurnal cycle from sunrise: yet this rule too may be shewn to have been an innovation on the primitive one of India, the cause and the time of which may both be probably discovered. As to the nations of Spanish America; when the Spaniards came among them many of them appear to have been reckoning their cycle of noctidiurnal time from morning, and some from midnight. These are questions and distinctions however which may properly be reserved for the consideration of particular calendars. The rule of the new world, as it is often called, in this respect cannot have been originally different from that of the old; when even the inhabitants of Tahiti, or Otaheite, and of the neighbouring islands, were found to be still keeping the count of noctidiurnal time strictly in conformity to the primitive rule[q].

o De Emendatione, ii. 129. C.

p iii. Lec. i. pp. 42, 43.

q "The natives have distinct names for each day and each night of the month or moons. They do not however reckon time by days but by nights. Hence, instead of saying, How many days since? they would inquire, *Rui hia aenei?* How many nights?" Ellis' Polynesian Researches, vol. ii. ch. xiv. p. 420. (1829.)

As to the Indian rule, in particular, the question proposed by Alexander to the Gymnosophist, in B. C. 328, and his answer[r], would imply that they were even then reckoning the noctidiurnal cycle from morning. So also Ælian's account of the time of the self-immolation of the Gymnosophist Calanus at Babylon, B. C. 326, viz. sunrise; a time no doubt chosen on purpose: Ὁ μὲν ἥλιος αὐτὸν προσέβαλλεν, ὁ δὲ αὐτὸν προσεκύνει[s]. The Indians of this period indeed saluted both the rising and the setting sun: Καὶ τί σοι τοὺς Ἕλληνας λέγω, ὅπου καὶ Ἰνδοὶ ἐπειδὰν ἕωθεν ἀναστάντες προσεύχωνται τὸν ἥλιον . . . πρὸς τὴν ἀνατολὴν στάντες . . . διὸ καὶ τούτοις ἱλεοῦνται τὸν θεὸν δὶς καὶ ἀρχομένης καὶ δυομένης τῆς ἡμέρας[t]. The mere act of such adoration however, either at morning or at evening, wheresoever the sun was an object of worship, demonstrates nothing of the rule of the noctidiurnal reckoning. In Philostratus' Life of Apollonius there is abundance of instances of his adoring the rising sun; and yet there can be no doubt that he reckoned his noctidiurnal cycle just like the rest of the Greeks.* On this subject however thus much may suffice for the present.

* Could Philostratus' life of Apollonius be treated as an authentic account of the customs and usages even of the places supposed to have been visited by him; we might argue from it that the popular and even the legal reckoning of day and night in India, in his time, was still from sunset or evening.

For when he arrived at Taxila[u], according to the rule of the country it is said no stranger could be allowed to stay there more than *three* days together: yet that the king dispensed with this law in favour of Apollonius, and allowed him to remain *four* days, upon the plea that he had arrived only in the *afternoon*, that is, towards the *end* of some one day[x]. Thus the day of his arrival was to be a *dies non*, as too short to be taken into account; and the three days allowed him by law were to be reckoned from this day at even.

Yet Philostratus is not consistent with himself. The days actually mentioned are the day of the arrival[y], the day after[z], and the next[a]: which Apollonius is made to reckon the last of those allowed him by law[b].

r Supra p. 167.

s Variæ Hist. v. 6.

t Lucian, Opp. ii. 278. De Saltatione, 17.

u ii. ix. 79. C: xi. 85. C: xv. 104. C: 106. B.

x xv. 104. C.

y ii. xi. 85. C: xiv. 97. D.

z xiv. 98. A: 102. B: xv. 102. C: 102. D: 103. A.

a 104. B.

b Cf. 104. C. D—106. B.

SECTION XV.—*General conclusion from the above premises. Two rules of the noctidiurnal reckoning incorporated in the Fasti Catholici, the Primitive and the Julian.*

The matter of fact then, which inquiry into the rule of reckoning the cycle of day and night in all quarters of the world, and at all periods of human history, brings to light, being every where the same; the conclusion deducible from it rests on the broad basis of an almost universal induction: viz. that there must have been from the first a simple and uniform rule of this kind, every where recognised and every where observed; a rule, coæval with the origin of time itself, and as widely extended as the compass of the habitable globe; a rule, from which every other (even those which ultimately superseded it) is to be derived; but in comparison of which, in point of antiquity and in point of extent, even those which have been longest substituted to it, and most generally used instead of it, are of recent date and of limited circulation: none having been original and independent of every thing else of the same kind, none having existed from the first, and none having been universal, but this.

There could not be any question therefore, that the noctidiurnal rule of our Fasti Catholici was bound to conform itself to this state of the case; and if it began with being conformed to it at first, it must continue to be so until the last: for the cycle of day and night itself cannot be supposed to have gone on in any but one way from first to last. The noctidiurnal rule of our Fasti then begins with being conformable to this primitive one, and it never ceases to be so down to the end. Its rule in this respect is invariable, as much as the rule of nature. But we do not exhibit it in every division of our tables: we have considered it sufficient to do so in constant connection with one of these divisions only; viz. that which contains the two types of the equable reckoning of noctidiurnal time and of annual time in conjunction; the equable cyclical, and the equable Nabonassarian, perpetually; the former of which, as we have already explained[c], is the proper form of the combination

[c] Dissertation iii. chap. iv. sect. ix. pp. 128, 129.

of noctidiurnal time with annual from the first, through the integral period of 24 hours, or of the mean solar day and night.

It is no necessary consequence however that, because the rule of the noctidiurnal cycle *de facto* was of one particular kind at first, it may not even hypothetically be supposed to have been of another kind, from the first also. There is no incompatibility between even two actual rules of this kind; if both are not supposed to be in actual use in the same way, or in the same place, at once. The noctidiurnal cycle, in the sense of the period of 24 hours of mean time perpetually, might be referred to evening and reckoned from evening, and might be referred to midnight and reckoned from midnight, each in its proper order of time; and yet neither of the periods so reckoned interfere with the other. Let the fact be as certain as it may that the noctidiurnal rule at first was to reckon from sunset; it must still be equally certain that the rule at present, according to the Julian or the Gregorian calendar at least, is to reckon from midnight: and as we have repeatedly observed, a true representation of the course of time in all its parts perpetually must be adapted to every actual state of the case; and must be just as competent to account for the present as for the past.

There could be no question consequently but that the Julian rule of the noctidiurnal reckoning was bound to enter our tables also; and that too from the first. The only question could be, in what form it must first appear there? and whether as a proleptical reckoning of its kind, or as an actual one? And the decision of this question would depend on that of another; whether it was possible for the same succession of night and day to have begun in one respect and with one relation at sunset, and in another and with a different relation at midnight; and yet to have been equally actual and equally the first of its kind, in either case?

It would be premature to enter on this question at present. Suffice it to say, there is good and sufficient reason for considering each of these cases possible; and not only possible but actual. The proper primitive rule of the noctidiurnal cycle then is incorporated in our Fasti from the first:

and yet the proper Julian rule is incorporated with it also. And as the former is attached in our tables to the proper representation of primitive annual time, so is the latter to that of Julian; which, under the circumstances of the case, (as we have already explained[d], and as it will more fully, we trust, appear hereafter,) is the same in reality as the perpetual representation of natural annual time itself, supposed, in the first instance of all, in strict conformity to the proper Julian rule, to have begun from midnight.

APPENDIX TO DISSERTATION IV.

CHAPTER I.

On the importance of the fact of an universal rule of the noctidiurnal cycle to the question of the common origin of all mankind.

SECTION I.—*The natural epoch of the noctidiurnal cycle, (irrespectively of particular meridians,) noon or midnight.*

The fact, which has thus been established on the basis of a general induction, is very important in another point of view. It proves something beyond itself; and that something of unspeakably greater consequence, viz. the common origin of all mankind: and it has an use and a tendency beyond its subserviency to a true scheme of chronology; viz. to illustrate the truth of Scripture. But to make this appear, some further preliminary explanations are necessary.

The sensible phenomena of the diurnal revolution might all be accounted for on the hypothesis that the earth stood still in space, and that the sun and the heavens performed an entire revolution about it in the course of every twenty-four hours. And on this principle did many of the ancients* account for them; among whom it was long an undisputed assumption in physical astronomy that the earth was the centre of the universe and immoveable; while the

* We say *many* of the ancients: for we entertain no doubt that the truth on this point was always known to the ancient Egyptians. We

[d] Supra Diss. iii. ch. iv. sect. vii. pp. 124, 125.

sun and the stars were circulating round it perpetually from east to west.

If this were really the case, then what *appears* to take place every day, with respect to the cycle of day and night, and to the alternation of light and darkness, would actually be matter of fact. The sun would truly be brought by its own proper motion to where it seems to be, when first discovered in the morning in the east; and truly to where it appears to be, when perceived at noon in the middle of the sky; and truly to where we conceive it to be, when visible for the last time before it sets in the west. In this case too, the sun would really visit every meridian on the surface of the earth, within the compass of the same twenty-four hours, in its turn; each of them remaining at rest and waiting as it were to receive it.

But the falsehood of this assumption has long been demonstrated: and the real state of the case being exactly the reverse of such an hypothesis, viz. that, so far as this sensible motion from east to west is concerned the sun and the heavens are perpetually at rest, and the earth only is constantly revolving, in the opposite direction, from west to east; it follows, that the sun cannot be in one place, (except to our own imaginations,) when it is first seen, rising above the horizon in the morning, and in another, when it is seen in the highest point of the sky, culminating at noon, and in another, when it is seen for the last time, dropping below the horizon in the evening. It must be in one and the same place absolutely, if not relatively, under all these circumstances alike. The sun cannot have changed its position, with reference to the earth and the particular localities on its surface, between rising and noon and noon and setting; but the parts on the surface of the earth must have changed their's relatively to the sun. It follows that the sun does not visit one meridian after another, in the compass of the same twenty-four hours; but that one meridian after another, within the same space of time, is successively presented to the sun. It follows too, that all meridians are as it were summed up and comprehended in the

learn too from Cicero[a] that the philosopher Hiketas, of Syracuse, (as Ernesti corrects the reading of Niketas,) according to Theophrastus, had a very correct idea on this subject; so much so, that, as Bailly observes[b], the mere representation of his opinion as given in that passage of Cicero has been thought to have first suggested to Copernicus the true theory of the sidereal and planetary motions.

[a] Academicæ quæstiones, iv. 39, 123.
[b] Astronomie ancienne, livre viii. § ix. p. 221.

sun, because each in its turn passes through the centre of the sun. The sun is as it were the focus of all meridians. Each in its turn is presented, under similar circumstances, to the sun, at the proper moment of its proper noon; and the plane of each alike, at that moment, being produced passes through the centre of the sun.

It follows from this fact too, that the sun is always shining, as it does at noon, on some meridian; and that somewhere on the earth, as constantly presented to the sun and as constantly seen from the centre of the sun, it is *noon*, whatsoever it may be, at the same moment of time at different parts of its surface, all but that one for which at the time in question it is thus noon. It is noon somewhere on the earth, as contemplated from the centre of the sun, even when it is morning or sunset for a given meridian of the earth itself. To the eye of a spectator, placed any where on a line of conjunction of the centre of the earth with the centre of the sun, the appearance of the earth at all times would be the same as that of the moon at the full to a spectator on the earth.

Now as the earth exerts this motion of rotation about itself, and as the sun is the centre and source of light and heat, and yet the alternation of light and darkness is inseparably connected with the diurnal rotation; the noctidiurnal cycle, as comprehending both this rotation and this alternation perpetually, depends on the sun as much as on the earth; and *vice versa*. And both being regarded as alike instrumental in the production of this common effect, and the effect itself as something one and the same perpetually; it must be evident, from what has just been shewn, that to the sun *as* the sun, and to the earth, *as* the earth, thus inseparably associated by nature in the production of this common effect of the agency of both, which we call the noctidiurnal cycle; there can be no epoch of the cycle (that is of the first beginning, or of the completion, of this common effect of their combined agency) but one of these two; the point of noon, or the point of midnight: the point of noon, if we look first and principally to the proper part of the sun in the completion of the joint effect, which is the diffusion of light and heat, over the surface of the earth presented to it, to the utmost extent for which it is capable of being so diffused at once; the point of midnight, if we attend first and chiefly to the proper part of the earth, in the beginning of the process and in the gradual consummation of the effect, by bringing every part of its surface, which can be presented at once to the light of the sun, successively within the sphere of the solar radiance; until the whole is fully illuminated and at once.

For it is manifest that, were there no such thing as the diurnal rotation, the sun would shine on one half of the earth perpetually; and one hemisphere would be constantly lighted up, and the other would be constantly in darkness: and were there no such thing as the light of the sun, the diurnal rotation would present the different halves of the surface of the earth to the sun, to no purpose; all would be enveloped and shrouded in darkness continually. We may if we please then regard, in the first place, the proper effect of the sun in this joint work of the alternation of light and dark, all over the earth; or if we think fit, the proper effect of the earth: and we may assume the proper epoch of the noctidiurnal cycle itself accordingly; either as that of the moment when the effect is complete and perfect in a given instance, the point of noon, or as that when it is first beginning to be so, the point of midnight. But to one of these, as the joint effect of the sun as the sun and of the earth as the earth, does it seem necessary to refer it. The noctidiurnal cycle therefore, in its most abstract point of view and independently of one particular reference more than another, yet still as the joint effect both of the sun and of the earth, which must be produced and completed in time and by succession, has only two epochs founded in the nature of things, the point of midnight or the point of noon*.

* The word meridian in English is derived from the Latin meridianus, and that from meridies. The best Latin authorities explain the origin of this word (meridies) in their own language, as if it were a change or corruption of medidies; and consequently compounded at first of medius and dies[c]. Varro tells us he had seen it himself written medidies, not meridies, in an ancient inscription at Præneste; to the authority of which he seems to have attached some importance: Meridies ab eo, quod medius dies. D antiqui non R in hoc loco dicebant: ut Præneste incisum in solario vidi quod Cornelius in basilica Æmilia et Fulvia inumbravit[d].

Medius and dies in composition would properly form mediidies: and this might be contracted into medidies: the second syllable in which would consequently be long. The second syllable in meridies and meridianus is certainly long[e]: and this is the strongest argument at first sight of the actual derivation of meridies from medius and dies.

The second syllable however, both in *meridies* and *meridianus*, might come, in the course of time, to be treated as long even though it had originally been short. The same thing has happened in other instances. In our opinion, the true explanation of the origin of the word involves something more philosophical, and more in accordance with the distinction

c Cicero, Orator. 47, 157.
d De Lingua Latina, v. p. 52.
e Martial, iii. Epigr. 67. Varro, apud Nonium, Fragm. p. 287.

SECTION II.—*The epoch of the noctidiurnal cycle, with respect to particular meridians, sunset or sunrise.*

If this however be the case; it may be demanded how it has come to pass that noon and midnight, which on this principle must have been the properest epochs of the cycle, have been the least of all characterised by general use and observance; the former having always been confined to the astronomers, and being so still; the latter having been peculiar at first to one or two of the nations of antiquity, the Romans and the Chinese; being recent of introduction in comparison of the primitive rule; and however generally recognised and applied at present, yet being indebted for that generality, humanly speaking, to an accident, the universal reception (among Christians at least) of the ancient Roman calendar, in the shape of the Julian correction.

The true answer to this question is that noon or midnight, as the natural epoch of the noctidiurnal cycle in its most abstract and general point of view, may be said to be irrespective of particular localities on the surface of the earth called meridians; or respective of no one more than another, Noon or midnight is the epoch of the noctidiurnal cycle as the joint effect of the earth as the earth, and of the sun as the sun; of the diurnal rotation as referred to the centre of the earth which is always at rest, and of the alternation of light and dark as referred to the sun, which is always at rest too, and as an equal affection of both halves of the earth as referrible to the sun and the earth at once. Referred to either of these epochs, the noctidiurnal cycle is always just beginning or always just complete. But the actual cycle of day and night, the actual dispensation of light and dark, includes all the gradations between the beginning and the completion of this process every where; and therefore it cannot be

which we have been endeavouring to establish in the text. *Merus* in Latin has the sense of *purus, simplex, sincerus*. *Merum* (sc. vinum) is *pure wine;* unmixed wine; wine the best and most perfect of its kind; wine in its most natural state. On the same principle, meridies would be *mera dies*, mere day, perfect day, high-day: for noon is really the perfect state of day; the time when light is most generally diffused and most intense, and day is consequently most complete. The common derivation of *meridies* from *medius* and *dies* is given by Isidore[f], but so also is this from *merus* and *dies*. *Meridies* dictus quasi *medidies*, hoc est medius dies, vel quia tunc purior est dies. *merum* enim *purum* dicitur. in toto enim die nihil clarius meridie, quando sol e medio cœlo rutilat et omnem terram pari claritate illustrat.

[f] Origines, v. xxx. 44. F.

irrespective of all distinction and all succession of localities on the surface of the earth. The sun indeed is constantly shining; and therefore is constantly illuminating every part of the earth which is actually presented to its rays; but the diurnal rotation is performed in time. All parts of the surface cannot be presented to the sun at once; and if they are each to be presented in turn and in succession, the sun must shine upon each in its turn and in succession also; and so must make it day for each in its turn and in succession too.

And this brings us at once to the point at which we are desirous of arriving, with a view to the illustration of Scripture, and to the verification of the fact of the common origin of all mankind by that of a common rule of the noctidiurnal cycle. The diurnal rotation being transacted in time, yet constantly going on, and all parts of the surface of the earth being affected by it alike; the figure of the earth being that of a sphere or a spheroïdal body, and all parts of its exterior or circumference being carried perpetually forward by the motion of circumrotation from west to east; it follows that, whatsoever part of the surface is brought by this motion of circumrotation within reach and perception of the rays of the sun, the opposite part to this, at the same moment and by virtue of the same motion, must be carried out of the reach and of the perception of the same light of the sun. The same instant in the act and process of circumrotation which brings one part of the surface of the earth, (that is one particular meridian,) within view of the sun, removes the opposite part to this, that is of the same meridian, out of sight of the sun. There can be no moment consequently when it is sunrise or the beginning of day on the ascending circle of a given meridian, and it is not sunset or the end of day for the descending one of the same. No one will say that this is not necessary; that it can be otherwise; that it is not the inevitable consequence of physical facts, such as that the sun is stationary in space relatively to the earth, and can shine on those parts of the earth only which are exhibited to its rays; that the earth is an opaque body, and cannot transmit the light of the sun from one of its surfaces to the other; that it is a spherical body, and can present only half of its circumference to the sun at once; and though it has a motion about its own axis, yet that this motion produces its effects in time, and therefore presents the different parts of the surface of the earth to the sun in succession; and consequently at the same moment at which it presents some to its light it withdraws others from it; and therefore if it is always making it the beginning of day, dated from the first perception of the light of the sun, for some part of the surface or other, it is always making it

the beginning of night, dated in like manner from the last perception of the light of the sun, for some other part of the surface too; viz. that which is diametrically opposite to the former.

SECTION III.—*A common beginning of the noctidiurnal cycle from the same epoch of morning or of evening in all parts of the earth impossible.*

This being the case; is it conceivable that the revolution of day and night could have begun any where or at any time, (if it had only a beginning *some*where and *some*time,) so that it should have been either the beginning of day or the beginning of night at every part of the surface of the earth alike? or when, if it was truly and physically the beginning of day for one locality, it must not have been as truly and physically the beginning of night for another, the opposite one to that? If not, how then shall we acconnt for the fact of an universal reckoning of the cycle of day and night itself? a reckoning as old as the beginning of the cycle in connection with human history, and one which supposes the cycle of day and night itself to have begun some time or other every where alike.

If we may assume that when this cycle, in connection with human experience, first began, the centre of the earth, (which is always in the plane of the ecliptic,) was also in the plane of the equator; we shall only suppose a state of the case which would be the best adapted *a priori* to serve as the foundation of an uniform rule of the reckoning of the cycle itself. For the moment, when the centre of the earth is thus situated simultaneously in the plane of the ecliptic and in that of the equator also, is the moment of the vernal or of the autumnal equinox; and a moment which is coinstantaneous to all parts of the surface alike. And at this moment the proper day for every meridian on the surface of the earth is equal in length to the proper night; and this day at this moment for every meridian might be every where divided into twelve equal parts called hours, and the night into as many others equal to those of day: and such a division, and as so made at this moment, would be the proper division of the proper noctidiurnal cycle of every meridian into 24 hours of mean time; the proper measure of such a cycle every where and for every meridian alike. Under these circumstances, we might possibly account for the simultaneous origin of similar and analogous modes of reckoning the cycle of day and night, coæval with the origin of the cycle itself; some from the beginning of day,

and others from the beginning of night, in all parts of the earth alike.

But to account for the origin of any one actual and identical rule in all parts of the earth at once, even under these circumstances, would be impossible. The fact would still hold good, even under such circumstances, that the actual beginning of day at any one of these localities would be the actual beginning of night at the opposite one: so that an identical rule of the cycle, coinstantaneous in its origin and equally *de facto* at all parts of the surface of the earth at once, would be physically out of the question. There might be two general rules of the kind, under such circumstances, one for one of the two opposite halves or hemispheres of the earth respectively, and the other for the other; but there could not be one general rule in the same sense and at the same time for both.

SECTION IV.—*Inference from the above premises: That the primitive rule of the noctidiurnal cycle was the proper rule of some particular meridian at first; and was propagated afterwards by the dispersion and propagation of mankind over the rest of the earth.*

If then the fact holds good, that traced as far back as it may be from the present day, one rule of this kind only can be discovered as actually recognised, received, and observed among mankind, a rule which has continued invariable all along, or has been changed for any other only at a comparatively recent date; again we demand how is this fact to be accounted for? particularly by those who, without maintaining the eternity of the present system of things, refuse to believe in the revealed account of its origin; and especially in the Scriptural account of the first production and of the subsequent propagation and diffusion of men themselves?

If the families, races, and distinctions of mankind, by which the earth has always been peopled and always been occupied in succession, have had different and independent origins; how has it happened that they have always and every where agreed in that, which without agreement at all times and every where must have been impossible—an uniform rule of the noctidiurnal reckoning? It makes no difference to the inference deducible from this fact, what this rule itself may have been; provided it has always been one and the same. Those therefore who deny the Scriptural account of the common origin of all mankind are bound to do one of two things; either to shew that there has never been *de facto* an uniform rule of the noctidiurnal reckoning among all nations and at all times, such

as we have investigated and substantiated every where by particular proofs; or that there have been two such rules at least, one the reverse of the other. They are bound to shew that, if there has been a general agreement among mankind to reckon the noctidiurnal cycle from *sunset*, there has been an equally general one to reckon it from *sunrise* also; and that, if the former is as old as human history and human experience, the latter can boast of just the same antiquity.

In opposition to the modern speculations and theories on this point, (which, if not put forward purposely in contradiction of the accounts of Scripture, are often proposed with too little attention to Scripture, and with an almost entire forgetfulness of its existence and its teaching;) let the believer in the truth of his Bible consider only what he reads of in *that*, and attend only to what he learns from *that:* viz. That wheresoever men and women are existing at present on the face of the whole earth, they are all the offspring of one Pair: That this Pair were created and brought into being in a certain locality of the surface of the earth, and found themselves connected from their birth with one such locality, and one only: That the cycle of day and night was older than this Pair: That it was going on, according to a certain law, when they came into being themselves, and that they found it so: That its law, for the particular locality *in* which and *through* which they first became connected with it, was such that sunset, not sunrise or noon or midnight, had been and was still its natural epoch: and that this state of things was no appointment of theirs, but the effect of causes both prior to and independent of their own existence, and of their own cooperation, and of their own control. Finding all this in Scripture, or perceiving that all this is plainly to be collected from Scripture; he can have no difficulty in drawing the inference to which such premises lead: viz. That the *natural* law of this cycle, for the particular locality in which the first pair of mankind first became acquainted with it, must have become its *positive* law to *them;* by which means a particular rule of the reckoning of the cycle was connected *de facto* at once with the beginning of human society and of human history. And such being the positive rule of the first pair of mankind, it would be the positive rule of their children, and of their children's children: and as long as all continued to live in the same locality, and all to form one great family, increasing continually in numbers, but still connected together and made one not only by the ties of blood but by those of neighbourhood, so long it must continue the common positive rule of all. Any change in the original

mode of reckoning the cycle, transmitted from the first pair of mankind, among their descendants would under such circumstances be morally impossible; whether physically so or not.

Nor would the destruction of the old world and of its inhabitants by the deluge make any difference in this respect; unless it could be shewn that those who survived the flood, Noah and his three sons, must of necessity have begun to reckon the cycle of day and night *after* the deluge, by a different rule from that by which they were still reckoning it *up to* the moment of the deluge itself. The difference produced by the catastrophe of the flood, with respect to this particular rule, would simply be that, instead of one pair of human beings, to use and apply this rule and to propagate it, as at first, there would be three pairs at least; all heads of distinct families and founders of distinct national divisions of mankind, yet all using the same rule in this one respect. The event of the dispersion, in little more than one hundred years after the deluge, by spreading these different families all over the habitable globe, would diffuse and extend this particular rule along with them too. There is no reason to suppose that, wheresoever these settlers went, they would not carry along with them this particular rule also; and wheresoever they themselves were ultimately planted, that there this rule would not be planted and located too. It is certain that they carried a common calendar along with them every where, and planted a common calendar along with themselves every where; and how could they do that, and not carry with them every thing distinctive of such a calendar also? its annual rule, its menstrual rule, and its noctidiurnal rule; and each as it was entering into the calendar previously, both by itself and along with the other two.

By these means a common rule of reckoning the cycle of day and night, the same which had existed from the very first day of human existence itself, might be, or rather would be, if not simultaneously yet gradually and in the course of time, established over all the earth; in parts too and under circumstances in which and under which such a coincidence, at one and the same moment and from the first, must have been impossible. And having thus been once introduced into all parts of the earth, and thus been once established and rendered domestic and familiar every where; ordinary causes, human and natural causes, (to say nothing of the Providence which has watched in a special manner over the civil calendar every where, and never allowed it to deviate beyond certain limits from the law originally prescribed for it,) would suffice to keep it in being.

CHAPTER II.

On the primary meridian epoch, and on the Cycle of the Restitution of meridians.

SECTION I.

SINCE then it has been made to appear that the noctidiurnal cycle has four different epochs, two of them irrespective of particular meridians, noon and midnight, the other two referrible to particular meridians, the point of sunset and the point of sunrise; let us assume that the actual epoch of the cycle at first, agreeably to the primitive rule, was the point of sunset; yet that an equally possible rule at first, and one equally consistent with the nature of things, and strictly withal in conformity from the first to the rule which exists at present, was midnight.

It has always been allowed astronomers, when their particular purpose required it, to suppose the existence of an imaginary sun, moving sometimes in the ecliptic and sometimes in the equator; but always with an equable motion in contradistinction to that of the actual sun. Let the same permission be conceded to us: and besides the actual sun moving at all times in the ecliptic, which we may call the *ecliptical* sun, as well as the mean sun of the astronomers confined to the equator, which we may denominate the *equatorial* sun; let us be allowed to imagine a *third* sun, not moving either in the ecliptic or in the equator, but stationary in the intersection of the plane of the ecliptic with the plane of the equator, called the first point of Aries; yet having a proper motion of its own, which is always carrying it round the earth in 24 hours in the contrary direction to that of the diurnal rotation of the earth itself. And this intersection of the ecliptic and of the equator in the first point of Aries being the point of the vernal equinox, (either of the true or of the mean,) let us call this third sun, supposed to be constantly stationed in that point, the *equinoctial* sun.

The word longitude, predicated of the sun, in the astronomical sense is to be understood of the true or the ecliptical sun: right ascension on the contrary, similarly predicated, of the mean or equatorial sun: both being reckoned perpetually eastwards, the former in degrees of the ecliptic, the latter in degrees of the equator, but both from the same point, considered as the zero or o of their

respective reckonings, viz. the first point of Aries, the intersection of the ecliptic with the equator; the *true* point of this intersection, as referred to the *true* equinox, the *mean* point, as understood of the *mean* equinox. Our third sun consequently, which is situated by hypothesis in this point itself, and constantly so, can have neither longitude nor right ascension in the proper sense of either of those terms; or none which is liable to be any thing but o perpetually. If right ascension then is to be predicated of it in any sense, and predicated continually, (and that it must be so follows of necessity, if it is constantly liable to change its place at the beginning of every year, as well as to be constantly circulating round the earth,) it can be only as its place at a given time afterwards is referrible to the epoch of the noctidiurnal revolution at first. And this epoch being assumed to be twofold at one and the same time, or two epochs being supposed, one actual the other virtual, the former sunset, the latter midnight; it is manifest that the right ascension of this sun referred to the former, in the first instance of all, will be o both in space and in time: but as referred to the latter will be 18 hours in time, (the difference of midnight and sunset at the vernal equinox,) and 270° in arc or space, corresponding to 18 hours in time.

We are at liberty also to assume, (until the assumption can be demonstrated to be contrary to the matter of fact,) that there was a time, coincident too, it might be, with the absolute actual commencement of the proper motion of each of these suns, the ecliptic, the equatorial, and the equinoctial, when they were all three in conjunction in the intersection of the ecliptic and of the equinoctial, and at the point of the vernal equinox: consequently when longitude and right ascension might have been predicable in one and the same sense of each; when for one cycle of day and night the ecliptical and the equatorial sun would both keep company with the equinoctial sun in its daily revolution about the earth, and the equinoctial sun would not yet have parted company with the ecliptical and the equatorial in their respective annual journeyings among the stars, one in the plane of the ecliptic, and the other in that of the equator. And having set out from this state of conjunction, the ecliptical sun in the orbit of the ecliptic, with a variable diurnal motion, sometimes greater sometimes less than that of the mean sun; the equatorial sun in the equator, with an equable motion, always the same with the mean motion of the actual sun; the equinoctial sun remaining in the point where all were at first in conjunction, but circulatiug daily about the heavens, with an uniform motion equal to that of the diurnal rotation: then, when the eclip-

tical sun had travelled through 360 degrees of the ecliptic in order, and the equatorial sun through 360 of the equator, and the equinoctial sun had described 365 circles about the heavens and part of a 366th; they would all three be found in conjunction again, under the same circumstances as before, or nearly so; the equatorial and the equinoctial sun strictly so, in the point of the mean equinox, and the ecliptic sun not very far from both, in the point of the true equinox.

The right ascension of the equinoctial sun, in the sense explained above, (that is, as referred perpetually to the epoch of the noctidiurnal cycle, whether sunset or midnight,) being once determined by the circumstances of the case at the beginning of the equinoctial or tropical year, must continue the same until the end of the year; but then, for the same reason, it must undergo a change; that is, it must be advanced or increased all at once to the amount of the epact of the tropical year itself. In one natural year of the standard of our Fasti there are 365 noctidiurnal cycles complete, which are equal to 365 entire revolutions of the heavens; and there is ·24225 of one more. Whatsoever then the right ascension of the equinoctial sun (i. e. its distance from the noctidiurnal epoch,) in time or in space, at the beginning of one such year, may be assumed to be; at the beginning of the next it must be assumed as that quantity and ·24225 more. And this will go on, accumulating in the same way with successive years, until it amounts to unity, or to one period of 24 hours in time, and to one circumference of 360 degrees in space, after the following manner:

Right ascension of the equinoctial sun, or distance from the noctidiurnal epoch, in time and in space, for the first five years complete.*

Years.	Time.					Time.		Space.		
	d.	h.	m.	s.	th.	d.		°	′	″
1	0	0	0	0	0	0 ·00000		0	0	0
2	0	5	48	50	24	0 ·24225		87	12	36
3	0	11	37	40	48	0 ·48450		174	25	12
4	0	17	26	31	12	0 ·72675		261	37	48
5	0	23	15	21	36	0 ·96900		348	50	24
6	1	5	4	12	0	1 ·21125	1 Rev.	76	3	0

And so on perpetually. And whatsoever the right ascension of this equinoctial sun, in the sense thus explained, at the beginning of every fresh natural year is thus seen to be; that of the equatorial sun, and within certain limits that of the ecliptical sun, at the begin-

* See the Introduction, Part iii. and the Supplementary Tables, Tables xxxi. xxix. xxvii. P. i.

ning of every such year, (and therefore once in every natural year at least,) will also be the same.

SECTION II.—*On the Restitution of meridians, and the period or cycle thereof.*

These preliminary observations having been made, the fact to which we desire to draw the attention of the reader is this; viz. that the equinoctial and the equatorial, and (as far as that can be considered once in the year the same with both) the ecliptical sun, having once met and been in conjunction in the intersection of the ecliptic and of the equator, and once had the same right ascension both in the proper astronomical meaning of that term, and in the peculiar signification explained above, under any conceivable form of circumstances; would not meet again in the same point, under the same circumstances as before, and again have the same right ascension in both senses, in less than 3999 tropical years + 1: i. e. 4000 natural years.

The proof of this assertion is easy. It is necessary only to apprise the reader that the annual difference between the mean natural year of our Fasti and the mean Julian being 11 m. 9 s. 36 th. the period in which this accumulates to an entire day and night, or integral cycle of 24 hours, (the nearest approach at least to such a cycle which in such a case is possible,) is 129 mean natural years of the Fasti[f].

		d.	h.	m.	s.	th.
100 years of the Fasti[g]	=	36,524	5	24	0	0
20	=	7,304	20	16	48	0
9	=	3,287	4	19	33	36
129	=	47,116	6	0	21	36
129 mean Julian years	=	47,117	6			

	h.	m.	s.	th.
Defect of 129 mean natural years of the Fasti on 129 mean Julian,	23	59	38	24

In like manner, the epact of one of our natural years is 5 h. 48 m. 50 s. 24 th. The annual defect then of one of these years on the mean Julian is 11 m. 9 s. 36 th. The epact at the end of one year is 5 h. 48 m. 50 s. 24 th.: and at the end of every 129 years is 6 h. 0 m. 21 s. 36 th. Each of these expressions as measures of right ascension in time, reduced to space or angular motion, stands as follows[h]:

f See the Introduction to the Tables, Part i.

g Supplem. Tables, Tab. xxxi. xxxii.

h See the Introduction. Supplementary Tables, Table xxvii. P. i. and P. ii.

Right Ascension.

Time.	Space.	Time.	Space.	Time.	Space.
m. s. th.	° ′ ″		° ′ ″		° ′ ″
8 0 0 =	2 0 0	5h. =	75 0 0	6h. =	90 0 0
3 8 0 =	47 0	48m. =	12 0 0	0m. =	0 0 0
1 36 =	24	50s. =	12 30	20s. =	5 0
		24th. =	6	1s. 36th. =	24
11 9 36 =	2 47 24				
		h. m. s. th.	° ′ ″	h. m. s. th.	° ′ ″
		5 48 50 24 =	87 12 36	6 0 21 36 =	90 5 24

Having these data then given perpetually, we should have no difficulty in constructing a table of right ascensions both in time and in angular motion, understood of the distance of the equinoctial sun, or, what comes to the same thing, of the equinoctial point, from the noctidiurnal epoch, at the beginning of every natural year of our Fasti, or at the beginning of every 130th year, from first to last, if necessary. Such a table, in fact, of the former kind, we have given in our general tables themselves; and such an one of the latter description do we actually exhibit among the supplementary tables of our Fasti—to which we refer the reader[k].

Now it appears from the above, and it will further appear from the table to which we refer; that at the end of each of these periods of 129 natural years of the Fasti, there is an excess on the entire period of 24 hours of 6h. 0m. 21 sec. 36 thirds. In 31 periods of 129 years each, this will accumulate to 7 days, or integral periods of 24 hours, and to 18h. 11m. 9s. 36th. of one more: for 6h. × 31 = 186 hours = 7 days, 18 hours: and 21s. 36th. × 31 = 11m. 9s. 36th. Now 18h. 11m. 9s. 36th. is the difference between 24 hours and 5h. 48m. 50s. 24th. the epact of one of our tropical years. It follows, that after 129 × 31 years, or 3999 years from the epoch, the right ascension of the epoch will be 18h. 11m. 9s. 36th. greater than at first; and consequently in one year more, that is, in 4000 years complete from the epoch, it will be 24 hours, or 0, greater than at first: that is, it will return to the right ascension of the epoch, whatsoever that was. And thus in 4000 years of our standard, but not in less, and in 4000 years as made up of these two numbers 3999 and unity, the right ascension of the epoch will be found to have come round, and to have been restored to the same state as at first: so that every thing will begin again, in order to proceed in the same way, and to go through the same round of successions and

[k] Introduction, Part iii. Table xxviii.

changes, exactly in the same manner, and in the same length of time, as before.

This period of 4000 years of the standard of the Fasti consequently is that of the restitution not only of the primary meridian epoch, but of every subsequent and intermediate one in its turn: for which reason we may call it the great period of the *meridian restitution*, (or as the Greeks would have expressed it, *ἀποκατάστασις*,) in general; the period which brings back the mean or astronomical sun, confined to the equator, (for we may now drop the hypothesis of the equinoctial sun altogether,) and the mean equinoctial point, to the same state of relation to each other and to the same proper epoch of the diurnal rotation, as at first. The importance of such a period both to the annual and to the noctidiurnal cycle as mixed up with each other from the first, and especially to the latter as referrible from the first and ever after to one epoch, coinciding with sunset, and to another, coincident with midnight—is almost self-evident; and it will still more fully appear hereafter. The year distinguished by this coincidence, B. C. 4, A. M. 4001, is thereby designated and pointed out, in a manner peculiar to itself, as an important and peculiar epoch in the constant decursus both of natural annual and of natural noctidiurnal time: and if there is any thing else to distinguish and characterise this year too above all others, (as indeed there is,) and to make it the counterpart of A. M. I. itself, or a new beginning as it were of Mundane time; it is only the more consistent with its character in that respect, that it should have been the epoch of a cycle of Meridian Restitutions too like this. But on this subject more hereafter.

DISSERTATION V.

On the two Miracles of Scripture, in the time of Joshua, and in that of Hezekiah, respectively.

CHAPTER I.

Preliminary considerations: Whether the natural measures of time may possibly have experienced any change.

SECTION I.—*Prejudice against this supposition,* a priori, *irrational and unphilosophical.*

THE inquiries which we have been instituting into the origin, the laws, the modes and distinctions of time both natural and civil, having been brought down to this point; we shall find it impossible to proceed any further without entering on a preliminary question, which ought perhaps to have been considered before now, if it was proper to be considered at all, and, though it might be postponed without inconvenience until the present moment, beyond this cannot be deferred any longer.

This question is simply the following: Whether the natural measures of time may possibly have experienced an interruption or change of any kind? Whether the course and succession of time itself, referred to those measures perpetually, has always gone on in the same way? Whether it can or it ought to be assumed antecedent to all inquiry that even the standards and measures of nature, fixed and unalterable as they appear to be, have never *de facto* under any circumstances since the beginning of things varied from themselves?

To institute such an inquiry, and even to propose such a question, as this, with respect to the civil measures of time, would be superfluous and almost ridiculous; nothing being more notorious and more unquestionable than the truth of this proposition; viz. That the civil or calendar measures of

time have not only always been liable, from their own nature and constitution, to change and variation within certain limits, in comparison of those of nature; but have actually and in repeated instances undergone such changes and experienced such variations almost every where.

But with regard to the standards and measures of nature, at first sight the case might appear to be different. The bare mention of a possible suspension or modification of any of the actual laws of nature is sufficient to excite a prejudice against the supposition itself: especially that of any interruption or change of the natural laws of time, which are justly considered the most constant and immutable of the laws of nature in general. And this prejudice would be as reasonable as it is natural, could we for a moment suppose such a contingency as that of the possible, much less the probable, suspension or alteration of any one of the laws of nature, independently of the consent and concurrence, (or rather of the direct interposition and will,) of the Author of nature and of the laws of nature too.

But what, we may ask, has prejudice to do with an inquiry into a simple matter of fact? and why should this question be prejudged, or decided as soon as proposed, merely because it supposes something contrary to our own observation and to our own individual experience? for, to assume that it supposes something contrary to *all* human observation and experience, is to take for granted the negation of the very matter of fact into which we propose to inquire. There might be no impropriety in treating of such a question even as one of mere speculation. It might be desirable, preliminary to an undertaking like that of the present work, (which has it in view to trace the course of time through all its measures from the beginning to the present day,) to satisfy ourselves and our readers beforehand, on good grounds, and without taking any thing for granted which might seem to require to be proved, that the undertaking itself was practicable; that we should not have to deal with an uncertain and irregular course of things in having to do with the course and succession of time, such as it has actually been from first to last. The idea of tracing this course and succession perpetually, either forwards or

backwards, presupposes the uniformity of the succession; and that uniformity the constant and regular operation of the same law or laws of the succession. But who is authorized to answer for the uniformity of a succession, which goes so many thousand years back? who can undertake to assure us from his personal knowledge that it has never varied from first to last? who could presume to answer such a question as this, in the name of all mankind? who could set up his personal experience of the present as the standard and measure of all the experience of the past? Who is prepared to maintain that even the laws of nature themselves are prior to and independent of an Author of nature? That there is any thing in these laws to make them absolutely incapable of change? That the same will and the same power, which imposed them at first, was not free or not able to modify, alter, or suspend them in any way, and to any extent, which it might please afterwards? or that no circumstances could ever occur to induce it to do so? Who shall undertake to assure us that such modification, suspension, or alteration of its own laws, by the same will and the same power which imposed them originally, did not enter into the plan and conception of its own operations from the first? or that some affection and modification, even of his own constitutions and appointments of this kind, after a certain time and under certain circumstances, was not as agreeable to the original design and intention of the Author of those constitutions, and as much a part of the plan which he had conceived and laid down for them from the first, as no affection nor modification of any kind *until* then, or *since* then, but one and the same uniform, uninterrupted, and never varying course of things both before and after?

In a word, if it is barely possible that even the laws of time, from the moment when the connection of time itself with human experience and human history of its effects first began, may not always have operated in the same manner; that circumstances may have arisen, (even out of that connection itself,) requiring a suspension or change, to a certain extent at least, of these laws themselves; it is allowable, we trust, and, (if the inquiry be begun and conducted in that spirit of humility and self-distrust, which is so proper in all

inquiries on the part of ignorant and fallible creatures like men into the acts and proceedings of God,) it may even be becoming to inquire whether what must thus be admitted to be *possible*, may not peradventure have also been matter of fact? It may be needful at least, and so far excusable, in *us*, before we proceed any further with *our* proper undertaking, to satisfy ourselves and our readers in good time that, while we are continuing our work, we are not in danger of labouring under an ignorance of something which it was necessary we should have known, if we were to continue it aright.

SECTION II.—*The question proposed for consideration, one of fact.*

The truth is, the question which we are proposing is purely one of FACT: and every one must allow that prejudice is not competent to decide a question of fact either one way or the other. The statement of the question is simply this: Has any suspension, any alteration, any interruption, of the established laws of time taken place, within the limits of human experience and human knowledge, and we may add, even of human history of such things, or not? It is not, whether any such suspension, or change, or interruption has been possible within such and such limits; but whether any has actually happened, or not? This question must be answered either in the negative or in the affirmative; but antecedent to and independent of all inquiry and consideration, it cannot be answered in either way. If it is to be decided, after inquiry and consideration, in the negative; then the inquiry (supposed to have been instituted and conducted in the spirit and frame of mind above recommended) can have done no harm, but on the contrary must have done good; must have given us reason at least to rely on the constancy and regularity of natural causes and natural effects, even greater, if possible, than was before possessed; and must have inspired us with a confidence in the stability of such causes and of their proper effects, founded on conviction, and not merely on tradition, prescription, or limited personal experience and knowledge of them.

But if, after due and becoming inquiry concerning it, the question is to be decided in the affirmative; if it should turn

out that, however improbable and incredible beforehand such a supposition may appear, there has been *de facto* a suspension, interruption, or change of a certain kind and to a certain extent even of the established laws of time; then how absurd and unreasonable must those prejudices now be pronounced, which would have stifled inquiry into the matter of fact in this instance, at the outset, and would have kept us for ever in ignorance of the truth! It is in vain to deny that if such a suspension, interruption, or change ever did take place, and for ever so short a time, it must have produced a *corresponding* effect; and if that effect was never after reversed or undone, a permanent effect: that the course and succession even of time itself in obedience to its own laws could not be altogether the same after this effect as before it. We should see clearly in this case what it must always have been our business and even our duty to do; viz. first of all, to satisfy ourselves of the *fact* of the interruption; and secondly, to ascertain, if possible, the nature and extent of the effect thereby produced on that course and succession of things, which we call time, before and after; and what allowance was to be made for it in tracing this course and succession either forwards, down to the date of the interruption and past it, or backwards, up to the same date and beyond it.

If we did this, we might still hope to trace the course of time either forwards or backwards, notwithstanding this interruption, in a manner consistent with itself and with its own laws perpetually; whether such as they were at first, or such as they might have become, by virtue of this interruption, in comparison of what they were before. If we neglected to do it, then, however correct in our assumptions at first, and however unerring in our application of them down to a certain time, we should infallibly find ourselves involved in some practical difficulty—some conflict between theory and matter of fact—at last. The state of the case, some time or other, would contradict our assumptions, and falsify our conclusions. The matter of fact would convince us at last, in spite of ourselves, that we had been ignorant of something which ought to have been known, and we had overlooked something which ought to have been taken into account;

and that we must either give up our assumptions, (that is, abandon our work,) or begin it afresh and do it over again, in order to correct the error into which we had fallen, and to set ourselves right with the truth at last.

SECTION III.—*Hypothetical statement of the case, as it might be considered* a priori *capable of affecting each of the measures of time.*

We shall explain our meaning more intelligibly, if we are allowed to put the case hypothetically, as it may be conceived capable *a priori* of applying to and of affecting each of the natural measures of time.

i. Let it be assumed to have been the law of the first and simplest of these measures, the cycle of day and night, that every such cycle should contain 24 hours of mean solar time only: and yet let it be supposed to have been *once* the case, (if no more than *once*,) that a certain *actual* cycle of day and night, instead of consisting of 24 hours of mean solar time, consisted of 48. Will any one deny that such an instance of variation in the established law of the noctidiurnal cycle until then, (though only in this *one* instance,) would make itself felt? would produce an effect? which effect would amount to *this:* That one cycle of night and day as measured by the period of 24 hours of mean solar time perpetually must have become equal to two? and yet without ceasing to be a cycle of day and night, an *actual* cycle of day and night, and *one* such cycle only, just as much as any other before or after it.

In tracing the course of time then downwards, through this first of its natural measures, we should encounter in this fact an infallible source of error, if we were not aware of it beforehand, and were not prepared at the proper time to take it into account. Measuring the noctidiurnal cycle by the period of 24 hours of mean solar time perpetually, we should inevitably mistake the actual cycle to which one of these periods, in its proper place and order in the entire succession of such periods from the first, *de facto* must have belonged: or, what amounts to the same thing, assuming one noctidiurnal cycle for one of these periods perpetually, we should inevitably assume one such cycle more than the truth. We

should make the actual number of noctidiurnal cycles commensurate with the period of 24 hours, carried down lower than the date of the occurrence of the anomaly in question, greater by unity than the truth.

ii. It may be said however that, admitting the possibility of such an error as this in the abstract, still we should have no means of detecting it; for what is there to distinguish one numerical cycle of night and day, or one individual period of 24 hours, from another? But let it be supposed that the succession of such cycles and such periods from the first had always been divided and broken up into sevens; that is, that the noctidiurnal succession, including that of this period, had always been measured by the hebdomadal. In the hebdomadal succession, every cycle of night and day and every period of 24 hours has found its place, and still continues to find its place, numerically and by itself, after an order which never has varied nor ever could vary. The *week* has never consisted *de facto* of either more or less than seven actual cycles of night and day; and none of these, in the order of *feriæ*, has ever taken the place of another, has ever been confounded with another; nor ever could be, and yet retain its own place and order (both absolutely and relatively) in the common succession of all alike.

Let it be assumed then that the law of the hebdomadal cycle from the first was such, that as each must contain neither more nor less than seven actual cycles of night and day perpetually, so each was to contain neither more nor less than seven different periods of 24 hours of mean solar time, one for each of these cycles respectively; and consequently 168 hours of mean solar time in all—and no more: but that it once came to pass notwithstanding, that one actual week of seven actual nights and days contained in reality eight of these periods of 24 hours instead of seven; 192 hours of mean solar time instead of 168.

Here then is another source of error, (if we are not aware of it, and are not prepared to take it into account,) that in tracing the course of noctidiurnal time in terms of hebdomadal downwards perpetually from the beginning, according to one law, and *that* the natural law of the hebdomadal cycle itself, we should be liable to allow to some one heb-

domadal cycle an integral period of 24 hours of mean solar time less than actually belonged to it. We should consequently from that time forward mistake the place and order of every numerical period of 24 hours, and through that of every numerical cycle of night and day, in the hebdomadal succession, to the extent of one such period and one such cycle at least. We should suppose, for instance, what was actually the *seventh* such period and such cycle, in the order of both in the week, to be the *first*; and so on: and how carefully soever our calculations of this kind might have been brought down from the first, (yet still according to one and the same law, the natural law of the hebdomadal succession,) as low as the date of this anomaly, the moment we passed beyond it, and applied to the same calculations the test and touchstone of the matter of fact, we should infallibly find them contradicted by it to the extent of one day at least. And this would be a means of detecting the error into which we had fallen, which every one must admit to be always possible, and always at hand, and always capable of application: because the hebdomadal cycle itself which supplies it has always been in existence some where or other; and always in the same form and shape in which it came into existence at first.

iii. With regard to the measure of time by the moon, or month; let it be assumed that according to the natural law of this measure from the first, the number of integral periods of 24 hours of mean solar time, which could possibly enter one and the same mean synodic revolution, was neither more nor less than 29: yet notwithstanding this that there was *one* mean synodic revolution at least into which 30 of these integral periods entered, and not merely 29: so as to make the length of that one revolution, 30 d. 12 h. 44 m. 2 sec. at least of mean solar time in all, instead of 29 d. 12 h. 44 m. 2 sec. only. In this fact too there is consequently a source of error and confusion, if we are not on our guard against it; when tracing the succession of lunar or menstrual time, according to one and the same rule from the first. For, suppose it possible to ascertain and define the date of every mean lunation in its turn, from the beginning down to the time of this anomaly; yet, unless we

stopped short there, or unless we took the anomaly which then occurred into account, we must of necessity mistake the actual date of every mean synodic revolution, later than the date of this interruption of the general law of such revolutions until then, by 24 hours of mean solar time. We must suppose every one, after this date, to be 24 hours earlier than the truth.

iv. With regard to the measure of time by years; let it be assumed that the natural annual cycle has been accompanied from the first by a corresponding civil cycle, like the Julian one of our Fasti; from which it has borrowed those terms and exponents which it has required perpetually to define and to distinguish asunder its own constituent parts, as it is made up of days and nights each of which must have a name and a number of its own; as it is divided into moons or months from its connection with the lunar cycle; as it is itself characterized and discriminated (in its own course and succession) by the alternation and phenomena of seasons, and therefore divisible into spring and summer, autumn and winter, each of which has an ingress or epoch of its own, both requiring and admitting of a Julian name and date. Let it be supposed that the proportion of these two annual cycles to each other, as proceeding *pari passu* from the first, was such that the former was liable to recede on the latter, (the first fixed term in the former on the corresponding term in the latter,) at the rate of 11 m. 9 s. 36 th. every year, but no more; yet notwithstanding this that the former in some one year receded *de facto* on the latter, 24 h. 11 m. 9 s. 36 th. of mean solar time at once: or, what amounts to the same thing, that though the natural annual cycle of this kind never contained either more or less than 365 integral periods of 24 hours, and 5 h. 48 m. 50 s. 36 th, of a 366 th.; some one corresponding Julian cycle for the time being actually contained 366 such periods, and 6 hours of one more.

If this be admitted as matter of fact, is any one prepared to deny that not only every cardinal date in this natural annual cycle, the vernal equinox, the summer solstice, the autumnal equinox, and the winter solstice, for the time being; but every particular term in the same natural year, from

the moment when this anomaly took full and complete effect in the Julian cycle associated with it, would be precipitated and drop *per saltum* 24 hours of mean time in the Julian reckoning? that every date in the natural year which had a corresponding date in the Julian previously, however closely it might be agreeing with that before, would descend 24 hours of mean time below it in the Julian notation, as soon as that anomaly took effect, yet without ceasing to be the same in itself?

There is consequently in this fact too a fresh and distinct source of error, affecting the constant measurement and constant expression of natural annual time in terms of Julian, from first to last; by means of which, if we were not on our guard against it and prepared to take it into account, we should be in danger of mistaking not only any cardinal date, but even any term soever in the former, by as much as 24 hours of mean time in comparison of its true place and date in the parallel succession of the latter: a danger which would be inevitable after the time of the interruption of the original proportions of the two cycles one to the other, if, as we have observed, we were not beforehand aware of it, and therefore prepared to take it at the proper time into account.

Supposing then the fact of even one (though no more than one) such interruption, suspension, or change of the established laws of time, as we are assuming; we see what liability to error in following out the natural operation of those laws from the beginning downwards, and what misapprehension of the truth, would be the inevitable consequence of an ignorance of this fact and of an inattention to it. It is just as certain, that the same ignorance and inattention in tracing any of the natural measures of time backwards, according to one law and one rule perpetually, would produce the same effect. In coming down, we have shewn that they would lead to an error of excess, beyond the truth: in going back, they would give occasion to one of defect, and below the truth. If such an interruption or affection of the otherwise established and preexisting laws of time, as we are supposing, was ever a matter of fact, it must have produced an actual effect on each of them and on their proper operation at the time; and that effect must have been con-

tinued and propagated to this day. It must be as true and as real in its consequences at least at this very day, as when it first took place. No one measure of time, which exists at present and operates at present, would be what it is at present, or exist in the state in which it is existing at present, or operate in the way in which it is operating at present, if nothing of this kind had happened. It is in vain to deny this, and yet to admit the fact of the interruption: unless it could be shewn that an interruption in one instance had been compensated and counteracted by an interruption in another, purposely intended to restore things to the state they were in before. Calculations therefore which proposed to ascend from the present day, i. e. from that which *now is*, to any former period beyond the date of this interruption, i. e. to that which *was once*, before any interruption had yet occurred; must take this interruption into account at the proper time, and in the proper way, or they could never succeed in arriving at the truth. They would never restore and represent the actual course and succession of things, which we call time, in all its parts, beyond the date of the interruption; however truly and faithfully they might have retraced it up to the date of the interruption itself.

SECTION IV.—*Whether the hypothesis which we are supposing was ever a matter of fact.*

And now having said thus much concerning the possibility of even such a matter of fact as this in the abstract, and concerning the necessary consequences of such a matter of fact to one and all of the natural measures of time, if it ever happened; it is time that we should return to the question which we began with proposing; whether the hypothesis itself was ever a matter of fact?

In reply to this question, we answer first of all; that if we are to discover, from any authentic or contemporary testimony to the fact itself, whether it was ever actual or not, we must go to Scripture. We do not mean to say that testimony even to such a matter of fact as this, and testimony which may be depended on and trusted for what it deposes to, and as far as it deposes to it, may not be found external to Scripture. This is a point which we shall have

to consider hereafter, and with as much care and exactness as its importance deserves; but at present it may stand over. No one will demur to the reasonableness of supposing that, if so extraordinary an event as the suspension or modification of each of the natural laws of time, which we began with imagining, was actually matter of fact at any period in the joint history of time and of mankind, it will be found recorded in Scripture only. It will be discovered in no contemporary account, accessible to us at present, (much less in any both authentic and contemporary,) except Scripture: and we ourselves should be the first to admit, (notwithstanding what we have just said about the existence of testimony to the same matter of fact, external to Scripture and independent of it,) that did we not find the recognition of the fact, and the account of the fact, first of all and most clearly in Scripture, we should never find it any where else, or in a form clear from doubt and ambiguity; i. e. in the shape of testimony, external to Scripture, which could neither be denied nor misunderstood.

Scripture is the history not only of time and of mankind in conjunction from the first, but also of all the extraordinary acts and proceedings of the Author of both, in his dealings with both, from first to last: and if one operation or proceeding of this kind can be more extraordinary than another, or (though all must be alike easy to Omnipotence) if one is calculated to appear to our own apprehension of such things to be greater and more inconceivable than another; whither should we go for the account of an operation like this, but to Scripture? where shall we find the constant display and exertion of the power and the wisdom concerned in an effect like this, except in Scripture? where, but in Scripture, shall we meet with the simple historical avouchment of a matter of fact so extraordinary as this; so different from the actual course of things both before and after; so contrary to all known experience in the same way; so opposed to the most fixed and inveterate principles of the universal conviction among mankind of what is probable and what is improbable, of what is possible and what is impossible, that few (perhaps none) have ever yet been able to read and apprehend it

aright, though legibly set before them in Scripture; and many perhaps will still refuse to apprehend and understand it rightly, though read to them out of Scripture, and plainly demonstrated to them from the testimony of Scripture itself.

In the next place we observe, That there are *two* extraordinary facts actually recorded in Scripture; the account of which being received and construed and understood according to its obvious, literal, and grammatical, and in one word simply historical, sense and meaning, supplies all the evidence which we can desire of the matter of fact in question: evidence not only the most authentic, because that of inspiration itself, but contemporary; and trustworthy, because contemporary, even had it not also been that of inspiration; but being both contemporary and inspired, evidence the most authentic and the most worthy of credit which in the nature of things was possible. One of these facts is the miracle affecting the sun in the time of Joshua; the other is the miracle which in like manner affected the sun again in the time of Hezekiah. The literal and obvious and simply historical sum and substance of the account of both these miracles amounts to this: that on each of two several occasions an addition of twelve hours of mean time was made to the length of the natural day: and an addition of twelve hours on each of two different occasions was the same thing in effect, and for the purpose of argument from the effect may without any material error be regarded and treated, as an addition of *twenty-four* hours at once.

It would thus appear, that we have all the proof of the matter of fact, which we could possibly have looked for *a priori*, in the express testimony of Holy Scripture; and the fact itself being admitted (as in all reason it ought to be) on such evidence of its truth as that; then to draw the necessary inferences from the fact, to judge in what manner it would necessarily affect each of the known measures of time, and what allowance would require to be made for that affection, so as to harmonize the course and succession of time *before* this fact with the same course and succession *after* it, so as to identify time and all its measures before this anomaly with

the same things after it; thus much it is manifest would come within the scope of human reason, and therefore might safely be left to men themselves.

It has happened however, (as the experience of some thousands of years demonstrates,) that even believers in the inspiration and truth of Scripture, and even those who contend for the literal construction of the text of Scripture in other instances, not more capable of a literal grammatical construction, nor on any principle of consistency more entitled to be literally and grammatically understood, than these two of its accounts, have been slow and reluctant, if not indisposed and unwilling, to apply the same rule of construction to these two parts of the sacred narrative; and have preferred any mode of understanding and explaining them to the simple, straightforward, and obvious one, suggested by the text of Scripture itself; viz. that of an actual *bona fide* addition of twelve hours twice made to the length of the natural day, with all the consequences to which such an addition necessarily leads. On the other hand, sceptics and infidels of all denominations, men of science falsely so called, minute philosophers and pseudo-rationalists, have no where in Scripture discovered, as they imagine, so much absurdity and so much falsehood, so much ignorance, or so much simplicity, as in these two accounts in particular; the literal construction of which it would suit their purpose better to admit, than to qualify or to deny: for the more literally the simple statement of things in these two instances, as they read it in Scripture, is to be understood, the more extravagant it must appear to them; the greater must be the absurdity involved in it, as they suppose; because the greater the contradiction of reason and common sense, of experience and observation, not to say of science and philosophy, at all times and every where.

In the further prosecution then of our proper undertaking, it is incumbent upon us to enter on the circumstantial consideration of both these accounts; with the hope that, while we are fulfilling a necessary duty of our own, we may also, through the Divine blessing upon our endeavours, serve another most desirable end and purpose; that of vindicating the letter of Holy Writ in each of these instances from the

supposititious glosses of well meaning but injudicious friends and advocates on the one hand, and yet of demonstrating on the other the truth of the fact itself, so recorded and so understood in each instance, against the caviller, the gainsayer, and the sceptic; by making it clearly appear, whether he will or not, that he must deny the evidence of his own senses at present, if he denies the literal truth of the matter of fact on either of the occasions in question.

We shall begin with the older of the two in point of time, the miracle in the days of Joshua; to which we may give the name of the *solstice* of Joshua, though applicable to it only so far as the idea of standing still is involved in this term solstice itself. For solstice, according to Varro[a], is the standing still of the sun: Solstitium (dictum) quod sol eo die sistere videatur: and the sun never actually stood still, since the world began, in the same sense in which it is every where spoken of as moving, except on this occasion.

CHAPTER II.

On the Miracle of the Sun in the time of Joshua; or the Solstice of Joshua.

SECTION I.—*First circumstantial criterion of the time of the miracle; the season of the year, and the month.*

The first criterion of the probable date of this miracle is furnished by Joshua x. 6—9: from which we learn that, after receiving the message of the Gibeonites, "Joshua ascended from Gilgal, he and all the people of war with him[b]," "and went up from Gilgal all night[c]." The night, according to the primitive rule, being reckoned from sunset, and the day from sunrise; if this march from Gilgal to Gibeon lasted all night, it neither began before sunset the evening before, nor continued past sunrise the morning after.

The distance from Gilgal to Gibeon may be assumed,

[a] De Lingua Latina, v. 53. Cf. Isidore, Origines, v. 34. 41. D. Solstitium dictum, quasi solis statium: quod tunc sole stante (non) crescant dies vel noctes. Also, De natura rerum, viii. 249. E. [b] x. 1–5. 7. [c] Ib. 9.

without any material error, from D'Anville's map of the ancient Palestine: and there we find it laid down, as nearly as possible, at fifteen Roman miles direct, or in a right line. The distance by road would be somewhat more. But both D'Anville and our own major Rennell[d] give us to understand, as the result of repeated comparisons of both modes of the estimation of distances, that to get the distance by road from the distance by line or direct, especially in the case of a single march, all we have to do is to increase the latter by $\frac{1}{8}$. On this principle, the actual length of the march, which must be supposed to have been made in this one night, may be assumed at 16·87 Roman miles = $13\frac{1}{2}$ of our own, or very nearly so.

And here it would be necessary to take into account the probable rate of the march itself, or the length of time in proportion to the distance marched over which it must be supposed to have occupied. And this would require us to consider the rate of marches in general, as made or as liable to be made by armies under different circumstances, and whether by night or by day. On this question something will be found in the note subjoined *. It is sufficient at

* The conclusion to which major Rennell has come, from the comparison of great numbers of marches both in ancient and in modern times, is this[e]: That the ordinary rate in a line of *eight* or *ten* consecutive marches, by road, may be estimated at 14 British miles a day; a single march, or one or two days' marches, at something more.

The physical powers of man in all ages, it must be presumed, have been the same: and whatsoever they have been at any time, or still are, they have their limits. The natural strength of a soldier in ancient times could not have differed materially from that of one at present; yet the personal encumbrances of a soldier of antiquity, arising from the difference in the manner of his equipment, and in the mode of carrying on war formerly, and in all the other circumstances of distinction between the military service of antiquity and the modern, were no doubt greater than those of a soldier at present. The shield and the spear, besides the helmet, the breastplate, the defences of the thighs, the arms, and the legs, and whatsoever an ancient soldier carried on his person in the shape of armour, were surely a greater burden than the musket and knapsack; which is all that a modern one has to carry with him or about him, in addition to his dress.

[d] Rennell, On the Anabasis, ch. i. p. 10, Lond. 1816. Cf. Appendix, part i. p. 317. 327.

[e] On the Anabasis, p. 5. 320, 324—327.

present to state the conclusion to which it leads; viz. That the physical capabilities of human nature both in former

It has been calculated that, over and above his armour, which was never taken into account, a Roman soldier on march could not carry a load of less than 50 or 60 pounds in weight; a fact which may give us a better idea of the truth and force of Virgil's simile,

> Non secus ac patriis acer Romanus in armis
> *Injusto sub fasce* viam quum carpit, et hosti
> Ante exspectatum positis stat in agmine castris.—Georg. iii. 346.

Yet unjust as such a burden might be, and more than ought to have been laid on a soldier, it was not more than he could bear; as the military experience of the Romans for some hundreds of years before the time of Virgil had fully demonstrated.

Vegetius[f] tells us it was the rule of the service even in his time, to accustom the troops to march 20 Roman miles in five hours' time in summer, and if necessary 24: Militari ergo gradu viginti millia passuum horis quinque dumtaxat æstivis conficienda sunt: pleno autem gradu qui citatior est totidem horis viginti quatuor millia peragenda sunt. Five summer hours of kairic time would equal six if not seven of mean time: and that would suppose 3 or 4 Roman miles to be marched in an hour, 20 of which would = 16 English; 24, 19⅕. The proportion of the Roman mile to the English in general may be assumed as 8 : 10: both being referred to the Olympic stade of the Greeks, eight of which went to a Roman, and ten would go to an English mile.

The rule alluded to by Vegetius was probably one of those established by Adrian; who seems to have carried the military discipline of the Romans to its highest pitch, and whose rules served as the manual of the service ever after. There was no actual war in the reign of this emperor, except late, and with the Jews; but the army was maintained by him in a state of efficiency and readiness for active service, such as it had never before attained to. It is reported of him[g] that he travelled over the whole of the empire on foot; and if testimony is to be believed, with his head uncovered, in all weathers; and as he was attended by his soldiers wheresoever he went, no doubt the ordinary rate of his day's journeyings was the ordinary rate of the day's march in his time; and that was not less than 20 miles a day; Quum etiam vicena millia pedibus armatus ambularet[g].

If we ever arrive at that period of our work, at which the Attic correction of Solon will come under consideration, we may have occasion to shew that the average rate of the march of Xerxes, B. C. 480, could have been little more than *six* Roman miles a day, = 4·8 English. No army however, in all probability, was ever so encumbered as that of Xerxes; or likely to march so slow. Yet even in his retreat, and when he was march-

[f] De Re Militari, i. cap. ix. Cf. cap. xxvii.

[g] Historiæ Aug. SS. Spartian. Adrian, cap. 10. Cf. Dio or Xiphilinus, lxix. 9.

times and at present being much the same, and having always had and still having their limits prescribed by nature

ing with all the expedition of which his army was capable, the average rate was but half as much more, about 9 Roman miles, 7½ English a day.

Polybius[h] speaks of one part of Hannibal's march through Gaul, B. C. 218; of 800 stades in 10 days; eight of our miles a day. But he too had peculiar difficulties to contend with.

B. C. 308, when Ophellas marched from Cyrene to join Agathocles at Tunes near Carthage, he was two months and upwards on the road[i]. The distance in a right line was not less than 1000 Roman miles; i. e. at the rate of 16·6 a day. But the first 3000 stades, or 375 Roman miles, were marched in 18 days, at the rate of 20·83 a day = 16·66 English. The march being over the desert all the way, the direct distance in this case would be the actual.

The same line of country was traversed by Cato Minor also in the autumnal quarter of the year of Pharsalia[k], from Cyrene to Leptis; and in the same time too—two months or upwards[k]. These accounts mutually illustrate each other; though Cato's march was terminated at Leptis Magna, Ophellas' was continued as far as Carthage. We learn however, from Strabo[l], that the distance from Berenice to Leptis, round the Syrtis Magna, (470 miles direct) took up 29 or 30 days; and that would be at the rate of 15 or 16 Roman miles a day.

No one indeed can have read the Roman historians, Livy, Cæsar, Tacitus; or the Greek historians, Polybius, Dio, Plutarch, Appian, and the rest; with any degree of attention, and not have had reason to conclude, in repeated instances, that among the Romans in particular the *justum iter diurnum militare* was 15 or 16 of their miles, 12 or 13 of ours; which is even below major Rennell's average standard of marches at present.

Polybius and Livy mention an eight days' march of the consul Manlius, B. C. 188, from Ephesus to Apamea[m], 180 Roman miles direct from Ephesus = 22½ a day: Tacitus an ordinary day's march, A. D. 69, of 16 Roman miles[n]. It is in our power to prove that, after the battle of Pharsalia (Sextilis 9 = June 5) B. C. 48, one legion of Cæsar's must have marched from Pharsalus or Larissa in Thessaly to Ephesus, in not much less than 47 days at least; and the distance being 470 or 480 Roman miles in a straight line, this could not have been at a greater rate than 10⅓ miles a day direct.

If Polyænus is to be believed, Philip of Macedon, (the contemporary of the Romans,) must have accustomed his troops to march 300 stades a day, (30 miles English), *φέροντας ὁμοῦ κράνη πέλτας κνημῖδας σαρίσσας, καὶ μετὰ τῶν ὅπλων ἐπισιτισμὸν, καὶ ὅσα σκεύη καθημερινῆς διαίτης*[o]. This statement

[h] iii. cap. L.

[i] Diodorus Sic. xx. 38—42: 41, 42. Theophrastus, Historia Plantarum, iv. iii. § 2.

[k] Lucan, Pharsalia, ix. 371—948: 374—378: 874: 940. Cf. Plutarch, Cato Minor, lvi: Livy, Epitome, cxii.

[l] xvii. cap. 3.

[m] Polyb. xxii. cap. xxiv. § 1. 9: Liv. xxxviii. 37: cf. 39.

[n] Historiarum ii. 40.

[o] Strateg. iv. cap. 11. Philippus, 10.

itself; the encumbrances of armies moving about from place to place in time of war, and the particular impediments to the freedom, and facility, and expeditiousness of their movements, having been much the same formerly as still;

appears incredible, unless there is an error in the numbers, τ′ instead of σ′ (200). Livy indeed has a march of this same king's of 60 miles Roman in one day [p], which is still more extraordinary if true; and Polybius another, from Limnæa on the Sinus Ambracicus, to Stratus on the Acheloüs, between evening on one day and daybreak on the next [q], in July or August B. C. 218: a distance of 38 Roman miles in a right line. He mentions another, from Corinth to Amyclæ, on the south of Sparta, (78 miles direct,) in six days and part of a seventh [r], = 12 or 13 miles a day.

Particular marches indeed may be found on record, which exceed the average rate: but these of course come under the description of forced marches. For example, the celebrated march of Epaminondas, B. C. 368, from Tegea to Sparta, and from Sparta to Mantinea; the former between supper time (sunset) and the third hour the next day [s], the latter between dark the next night and noon the following day [s]: though the former could not have been less than 33 Roman miles direct, and the latter is estimated by Frontinus at 40 [t]. The march of Sphodrias from Thespiæ, with a view to surprise the Piræus, B. C. 378 [u], contemplated a distance of 40 miles Roman in a right line, and upwards—to be travelled in one night: and though it was not completed before break of day, yet it had got as far as Thriæ, 30 Roman miles at least.

Xenophon mentions a march of Agesilaus in Acarnania, of 160 stades, or 16 of our miles, between sunrise and afternoon [w]; which Polyænus says was made between evening or sunset and morning [x]. He mentions another, from Orchomenus past Mantinea, between daybreak and dusk [y], which would be 13 Roman miles direct: another [z], B. C. 396, between sunrise and evening, of 160 stades, or 16 English miles. Plutarch records a march of Timoleon's, B. C. 345, from Tauromenium to Adrianium, between morning on one day and supper time on the next—a distance of 340 stades [a]; at a more leisurely rate the first day, at a more rapid rate the next: and another by Philopœmen [b], of more than 400 stades in one day, just before his death. Appian mentions a march of the Roman commander Galba, in Spain, B. C. 151, of 500 stades, in a day and a night [c]: and another, by Scipio Æmilianus, B. C. 134–133, of 300 stades, between

[p] xxviii. 7. B. C. 207. et 9. xxv. 34.
[q] v. cap. vi. § 5, 6.
[r] Ib. cap. xviii. § 1—3, 10. Cf. xix. § 2. Cf. also v. cap. xcvii. § 4, his march from Edessa to Larissa in five days and part of a sixth.
[s] Polybius, ix. cap. viii. § 2–13. Plutarch, De Gloria Atheniensium, cap. ii. Agesilaus, xxxiv. Xenophon, Hellenica, vii. v. § 9–14.
[t] Strategematum iii. xi. § 5.
[u] Hellenica, v. iv. § 20, 21.
[w] Hellenica, iv. vi. § 6. B. C. 391.
[x] Strategemat. ii. cap. i. Agesilaus, § 10.
[y] Hellenica, iv. v. § 18. B. C. 392.
[z] Ibid. iv. vi. § 6.
[a] Timoleon, xi. xii.
[b] Vita, xviii.
[c] Hispanica, vi. 58.

since it is found from experience that 14 British miles are as nearly as possible the utmost which could be allowed at present for the ordinary rate of a march even by day, and much more by night; the same limitation of the length of an ordinary day's march may very well be supposed to have held good in former times also.

On this principle, the distance which had to be marched in this instance, 13½ British miles, was the ordinary length of an ordinary day's march: of a march which, as made even by day, might possibly have occupied 12 hours of mean time to make it; in which case the rate of such a march could but little have exceeded one English mile an hour. But this march was not an ordinary march. It was a forced march. It was made at least on an occasion of emergency; and no doubt with all the despatch which the nature of the case would admit of. The rate of this march therefore would probably be greater than that of an ordinary day's march. And yet it was made by night; and marches by night cannot be made under any circumstances with so much expe-

the 8th hour of the day and morning[d]. Examples of this kind might be collected in abundance.

An army retreating before an enemy, or escaping from an enemy's country, naturally marches with all the expedition possible. Thus, even the Persian king Artaxerxes (Mnemon) retiring from among the Cadusii, (B. C. 385—384[e],) is said to have marched at the rate of 200 stades a day[f]. Tacitus has a march of this kind, U. C. 815, of 40 Roman miles in one day[g]. Antony, in his retreat before the Parthians, marched 240 stades in one night[h]: though the entire length of this retreat, according to the epitome of Livy[i], was but 300 Roman miles, in 21 days: i. e. at an average of about 14⅓ Roman miles a day.

The marches of Alexander were some of the most extraordinary on record. Ælian reports that he thrice marched 400 stades in one day[k]: Plutarch that he traversed 3600 stades in 11 days in pursuit of Darius[l]. Arrian makes Ragæ in Media only a day's march distant from the Pylæ Caspiæ, ἐλαύνοντι ὡς Ἀλέξανδρος ἦγε[m]: and yet it was 500 stades[n]. On such exceptions to his general rule as these, major Rennell has made his own remarks: to which we refer the reader[o].

[d] Ibid. 94.
[e] Diodorus, xv. 8. 10.
[f] Plutarch, Artaxerxes, xxiv.
[g] Ann. xv. 16.
[h] Plutarch, Antonius, xlvii. B. C. 36.
[i] Lib. cxxx.
[k] Variæ Historiæ, x. 4. Cf. Arrian, iii. 21: iv. 6: vi. 6.
[l] Alexander, xlii. Cf. Arrian, iii. 20: 25: 29.
[m] iii. 20.
[n] Strabo xi. cap. 13. cir. med.
[o] Anabasis, p. 6, 7.

dition as marches by day. It was made by Joshua and ALL the people of war; and whatsoever allowance may be made for the generality of this statement, still it must have been made by a very large proportion of the fighting men at once, out of a total of that description which amounted at this time to no less than 600,000. It was made too in expectation of encountering an enemy as soon as it was over; and therefore, no doubt, in order of battle all the time: for which reason, though the army which made it might be disencumbered of baggage, and carry little or nothing with them but their weapons of war, yet they must keep their ranks and their order; they must march more deliberately; and probably would require more restings and haltings on the road. On the whole then, if an ordinary march and by day, of this extent, could not be estimated at more than one English mile an hour; even this march, extraordinary as it was, yet being made by night, and under the circumstances which we have just been describing, could not be estimated at more than $1\frac{1}{2}$ of our miles an hour.

It follows that it would require nine hours of mean time at least to perform it. Consequently, if it took up *all* the night, the night must have been nine hours long at least. We are bound however to consider first, that this night march itself could not begin under any circumstances before sunset: and that for various conceivable reasons it might not begin exactly at sunset. A large army, and on such an occasion as this, might not be prepared to move exactly at sunset; especially if it had its preparations themselves to make after sunset, (of which more by and by.) We are bound to consider also that its object was to effect a surprise, to fall upon an enemy suddenly[q]: consequently it would purposely be so timed as to come on this enemy neither while it was yet night nor after it was already day; but if possible just at daybreak, just as it was beginning to be day, and when there was neither light enough to betray their approach, nor yet dark enough to interfere with their attack upon their enemies. Now it is well known that in all climates (certainly in that of Judæa) sunrise or morning is preceded by an interval of twilight; which at the vernal equinox would not be less than

q x. 9.

1 hour and 12 minutes of mean time, and about the middle of the spring quarter would be something more. It is possible therefore, and even on every account probable, that this march did not begin so early as sunset the evening before, and yet was over by an hour before sunrise the morning after: in which case, if it still took up nine hours of itself, as we have concluded it must have done, the night on which it was made, reckoned from sunset to sunrise, must have been 10 hours of mean time and something more at least in length.

Here then is the first criterion of the time and circumstances of the miracle which ensued; viz. that it must have taken place at that season in the natural year, when night for the climate of Judæa, reckoned according to the primitive rule, could not have been less than ten hours of mean time long, nor the day more than fourteen. Now the length of the longest day for this climate (exclusive of the effect of refraction, estimated at 2 m. 30 sec. for each end of the day, or 5 m. in all) is not more than 14 h. 7 m. of mean time. A variation of 23 m. on this maximum, that is from 14 h. 7 m. to 13 h. 44 m. for the same climate, in the natural course of things could not be produced in less than five or six weeks. If then the mean vernal equinox for the meridian of Jerusalem, (which is in fact the meridian of our tables,) B. C. 1520, was falling out April 5, 17 h. 47 m. 24 s. from midnight; and the length of the spring quarter may be assumed at 94 d. 7 h. 4 m. 10·32 sec.[q] the true summer solstice must be assumed July 7, about 15 h. 24 m. 36 sec. from midnight *. And the day being then exactly 14 h. 7 m.

* B. C. 1520.		d.	h.	m.	sec.	
Mean vernal equinox,	April	5	17	47	24 0	Mean time.
Equation of the centre		— 1	9	26	57·935	
True vernal equinox, April		4	8	20	26·065	Apparent time.
		d.	h.	m.	sec.	
Length of the spring quarter,		94	7	4	10·32	
		98	15	24	36·385	
		91				
Summer solstice, July		7	15	24	36·385	Apparent time.

[q] See the Introduction, part iii. Supplementary Tables, Table ii.

of mean time long, it must have been 23 m. or 24 m. shorter, that is, 13 h. 44 m. long, 37 or 38 days previously. Consequently about the very end of May.

On the strength of this coincidence then, i. e. (though we are far from contending that this alone would be sufficient,) yet judging from this coincidence merely as far as it goes, we might come to the conclusion that the actual time of the miracle which ensued, (a time when night for the climate of Judæa could not have been less than ten hours long, nor the day more than fourteen,) must have fallen out, in all probability, at the very end of the month of May.

SECTION II.—*Second circumstantial criterion of the time of the miracle; the full of the moon.*

Another criterion of the circumstances and of the time of the miracle is that it happened at or about the full of the moon.

We might have conjectured thus much even from the fact which we have just been considering; the march of a numerous army in order of battle, over a distance of $13\frac{1}{2}$ English miles by night: for which purpose moonlight would obviously be necessary. In the climate of Judæa, about the middle of the vernal quarter, (indeed at all seasons of the year,) the light of a full moon, or of a moon just coming to or just past the full, would answer this end almost as well as daylight: for the light of the full moon in that country is nearly equal to that of day in many other parts of the globe.

But we might still more probably have inferred this fact from the Hebrew term applied to the moon in this instance, in the text of Joshua[r], and in the reference to the same event which occurs in the prophet Habakkuk[s]. This term is *iree*, not *eedass*: and it is agreed among the learned in that language, that the first of these words is more peculiar and uncommon than the second; and that in the idiomatic use of both a distinction may be seen to hold good: viz. That *eedass* is applied to the lunar month as simply dated from the change, a state in which the moon itself is necessarily invisible; *iree*, on the other hand, to the month supposed to bear date from some visible state of the moon, and properly

r x. 12, 13. s iii. 11.

from the full to the full[t]. It is in our power to illustrate and confirm this distinction by the date of the birth and of the exposure of Moses; which Providence so ordered, that the birth fell out at or about one full moon, and the exposure (three months afterwards) at or about another: and in each of these instances, the word employed to denote these moons, is *iree*, not *eedass*.

In the third place, we may infer the same fact, and still more certainly, from the position of the sun and of the moon relatively to each other, at the time of the miracle itself. The sun it appears was over Gibeon, the moon in the valley of Ajalon[u]. Now we have only to turn to the most correct maps of the ancient geography of Judæa, to see that Gibeon was *east* of Ajalon and Ajalon *west* of Gibeon. It follows that if the sun was standing over Gibeon, and the moon was in the valley or depression of Ajalon, when those words of Joshua[u] were addressed to each of them, the former was on the verge of the sensible horizon in the east, and the latter on that of the sensible horizon in the west, at the same moment of time. That is, the moon was in opposition to the sun, and the sun to the moon. Now every one knows that this is the case, and *can be* so, only at the *full;* but that at the full the moon is and must be visible in the east when the sun is in the west, and visible in the west when the sun is in the east; and commonly visible at the same moment *on* the horizon in the east, when the sun is so on the horizon in the west, (and *vice versa;*) rising as the sun is setting, and setting as the sun is rising.

We must necessarily therefore infer from this position of the sun and of the moon relatively to each other at the time of the miracle, that the moon was either at that very time at the full, or just coming to the full, or just past the full. But forasmuch as the actual state of the case appears to have been *this:* That the sun was visible at this very time standing over a city situated on an hill, and the moon, though not yet invisible, was still to be seen only in a valley, (i. e. depression of the natural level of the ground,) and there too

[t] Cf. of *iree*, Job xxxi. 26. compared with xxix. 2; of *eedass*, see Numb. x. 10: xxviii. 11: 1 Sam. xx. 5: Ps. lxxxi. 3: Ezek. xlvi. 1: Ecclesiasticus xliii. 8: also Dr. Hales, Analysis, i. 123.

[u] x. 12.

only from rising ground; it is manifest that the legitimate inference from this state of the case would be not that the moon was just come or just coming to the full, but that it was some time more or less past the full. For had it not yet come to the full, it must have been set before the sun could have reached that elevation in the sky which it was actually occupying at the time: and if it was only just come to the full, it must still have been setting at sunrise; and before the sun could have reached its actual position in the sky at the time of the miracle, it must have been already set. Under no circumstances, but those of its being *twelve* hours or *more* past the full at least, could the moon have still been above the horizon, yet just ready to sink below it and out of sight, not only after the sun had actually risen, but after it had actually attained a certain altitude in the sky; which would not be the case until some time at least after it had risen.

This criterion therefore is the most determinate which we have yet ascertained. It fixes the time of the miracle to the time of sunrise, or to a certain time after sunrise, not less than twelve hours at least *after* the full of some moon: and taken in conjunction with the other, already pointed out, it designates and determines this full moon to be that of the month of May; and consequently at the *end* of May: and therefore if there were two full moons in this month, as under certain circumstances there may be in some months, it fixes the time of the miracle to that which was nearest to the end of the month.

SECTION III.—*Third circumstantial criterion of the time of the miracle; the day of the week.*

A third criterion of the circumstances and of the time of the miracle is this: That it took place on the morning of the *first* day of an hebdomadal cycle; that is, on the *first day of the week.* We may collect this from the fact that, after the arrival of Joshua at Gibeon on the morning of the miracle, there are distinct proofs[x] of *six* days' operations in succession, (including the battle of Gibeon itself,) but of no more. There is a continued account of military proceedings day by day, which begins on the morning of the battle and is brought

[x] x. 9–39.

to an end on the sixth day afterwards. And this, in our opinion, authorizes the inference that these proceedings must have begun on the day *after* the sabbath, and must have terminated on the day *before* it.

The first of these days is that of the march upon, and the arrival at, Gibeon, and that of the battle; including also the capture and destruction of Makkedah[y]. The second is the day of the destruction of Libnah; and also of the march upon Lachish[z]. The third is the date of the capture and destruction of Lachish; and also of the defeat of Horam, the king of Gezer[a]. The fourth is the date of the capture and destruction of Eglon[b]. The fifth is that of the capture and destruction of Hebron[c]. The sixth is that of the capture and destruction of Debir[d]. And with this, the list of cities, so taken on successive days one after another, is brought to a close for a time*.

The day of the miracle then having been the first of a series of six days in succession, it must have been the first day of the week; unless it could be shewn that one of these six days was a sabbath. It was consequently the day after the sabbath. And this fact will supply all the explanation which could be required of the march the night before. It might be desirable indeed, under any circumstances, with a view to surprise an enemy, to come upon him early in the morning; and therefore to march to where he was by night. But what, if the message of the Gibeonites, which apprized Joshua of the confederacy of the kings against them, and of the danger they were in, was received *upon the sabbath?* Who can disprove that hypothesis, or shew that it was received on any other day of the week? In this case, what alternative would Joshua have except to break the rest of the sabbath, if he set out to their assistance immediately; or if he must wait until the expiration of the sabbath, not to set out until after sunset at the earliest? In this case too it

* If there is any appearance of difficulty connected with the particulars of the above proceedings, it admits of being satisfactorily explained. In our own work on the chronology of the Old Testament they have all been considered in detail, and found to be consistent.

[y] x. 9–28. [z] 29–31. [a] 32, 33. [b] 34, 35. [c] 36, 37. [d] 38, 39.

is possible, and even probable, that he would have his preparations to make even after sunset; and therefore that he would not begin his march exactly at sunset—not until some time after at least.

These different criteria therefore of the circumstances and of the time of the miracle conspire together, and one confirms another. They all lead to *this one* result: That the actual date of the miracle is to be sought for, in order to be found, only in the middle month of the vernal quarter of the first year of the Eisodus, at or about the full of the moon in that month, and towards the end of that month; and on the first day of the hebdomadal cycle, that is the first day of the week. It is impossible that all these criteria should meet in any but one year, the true year of the Eisodus; or in any but one month of that year; or in any but one day of that month: and the year, and the month, and the day, in which they do actually meet, at the time of the Eisodus, if they can be discovered, will be the true.

SECTION IV.—*On the historical circumstances from the Eisodus to the date of the miracle.*

The date of the Exodus from Egypt was A. M. 2445, B.C. 1560; and that of the Eisodus, 40 years after, was A. M. 2485, B.C. 1520. Both these dates may be taken for granted at present. We hope to have an opportunity of confirming each of them hereafter.

The Jordan was crossed on the tenth day of the first month: the first day of which in this year falling March 17 dated from midnight, the tenth fell March 26 dated in like manner from midnight. The first event after the passage, which we have to take into account, is the general circumcision of the people: and this was such that its effects, it may well be supposed, would require time, in order to be entirely removed. The next was the celebration of the Passover; the first, in all probability, which had yet been formally observed since that which was kept in the second year after the Exodus: though this is a question which does not, in any the least degree, concern our purpose at present.

The time of this Passover, (the first undoubtedly which was ever celebrated in the land of Canaan,) is determined by a natural criterion; viz. that of the ripeness of the fruits of the ground—that is, of the barley harvest, coincidently with its celebration: so much so, that on the morrow after the Passover, (whether this be understood of the 15th, as we rather apprehend it ought to be, or of the 16th, of the current month,) the people ate for the first time of the natural productions of the country; i. e. of the harvest of that very year's growth, now ripe for the sickle.

And this coincidence, in our opinion, combined with the other consideration of the necessary effects of the administration of the rite of circumcision the day after the passage of the Jordan, determines this Passover not to the 14th of the first month, March 30, (dated from midnight,) six days before the mean vernal equinox, April 5, when even the barley harvest could not yet have been ripe, (at least on so large a scale, as to suffice for the maintenance of two or three millions of souls, from that time forward;) but to the 14th of the second month, April 29, 30 days later: when the harvest would be ready and generally too. No one requires to be told, that under special circumstances the Law itself permitted the celebration of the Passover on the 14th of the second month, instead of the first: and in our opinion the circumstances of this Passover were of that special description. This conclusion is further confirmed by the fact that the dispensation of Manna, which had begun on the morning after the 15th of this same month, (viz. the second in the calendar for the time being,) 40 years before; and which ceased on the morrow after the people had thus for the first time eaten of the corn of the land; on this principle ceased on the morning of the same day of the same month on which it began; and, as Scripture itself expressly declares it did, lasted 40 years exactly between[e].

The beginning of military operations therefore, (which was the seven days compassing of Jericho,) could not be earlier than April 29; or rather, if we include the seven days' feast

[e] Joshua v. 10–12. Exodus xvi. 35.

of Azyma, than May 7: but they might, and probably they did begin on that day. Setting out from that day at least, we have it in our power so to trace and so to arrange the course of subsequent events, (in our own chronology of the Old Testament they have been so traced and arranged,) that without confusion or inconsistency of any kind previously, the march of Joshua from Gilgal to Gibeon, on the night before the battle, is found to take place at last on the night of May 30; and the battle of Gibeon, including the miracle, on the morning of May 31.

Now, according to the first type of our lunar calendar, Period ix. iii. 15, the principal new moon, the new moon of Nisan, falling April 17 at 18 hours; the next, the new moon of Jar, would fall May 16 at 18 hours: and the πανσέληνον or full moon of that month, according to the calendar, would bear date May 30 at 18 hours. Respecting the true date of this full moon something will be said hereafter. It is sufficient to observe at present that the true date and the calendar date in this instance both fell on the same day: only that the former was some hours the earlier of the two.

The Dominical letter of the year, (B. C. 1520,) as our perpetual cycle of that letter shews, was D. Consequently May 30 reckoned from midnight was the *feria septima*, or Saturday: May 31 similarly reckoned was the *feria prima* or Sunday. All the criteria therefore of the time and circumstances of the miracle, which we have already determined, meet in these two days, May 30 and May 31—May 30 the day of the full moon; May 31 the day after the full; May 30 the Sabbath; May 31 the first day of the week; the night of May 30 the night after the full moon, and night of the march; the morning of May 31, the morning of the miracle: the year, to which this month and these days belong, the true year of the Eisodus, B. C. 1520: the distance of this month, and of these days of this month, from the primary event of the Eisodus, the beginning of proceedings in Canaan and west of the Jordan, the passage of the Jordan on the morning of March 27—such as the course of events meanwhile supposes; and neither more nor less than the necessity of the case requires.

We think then that, on the strength of these coincidences, we are authorized to conclude that the actual date of the first of the two miracles of Scripture, affecting the sun, (the solstice of Joshua,) was May 31, B. C. 1520.

SECTION V.—*On the date of sunset and sunrise, May* 30 *and May* 31, *for the meridian of Jerusalem, B. C.* 1520.

The date of sunrise on Saturday, May 30, B. C. 1520, for the meridian of Jerusalem, is determinable to about 5 h. 8 m. A. M., and that of sunset the same day to about 6 h. 52 m. P. M., apparent time in each instance. And the same date of sunrise and sunset respectively, on this same day, may be assumed for the ancient Gilgal, or ancient Gibeon: the meridians of both which places differed too little from that of the ancient Jerusalem to make any sensible distinction in this respect. The same dates of sunrise and sunset too, for all these meridians, may be assumed, without any material error, as still holding good for May 31, as well as for May 30; though in strictness sunrise would be a little earlier, and sunset a little later, May 31, than May 30.

Each hour of diurnal time then, under these circumstances, both May 30 and May 31, would be equal to 1 h. 8 m. 40 sec., and each of nocturnal, to 51 m. 20 sec. of apparent time: and the length of the day from sunrise to sunset would be 13 h. 44 m., and that of the night, from sunset to sunrise, 10 h. 16 m. We see consequently, that the state of the case, with respect to both these things, would be exactly such as we concluded it must have been, from the mere fact of a march between sunset and sunrise at this time, taking up nine hours itself, and supposing a night 10 h. 15 m. long at least.

Scheme of Ὧραι καιρικαὶ, *or of noctidiurnal time in kairic hours, from sunrise May* 30, *to sunset May* 31, *B. C.* 1520, *for the meridian of the ancient Jerusalem.*

	Hours.	h.	m.	s.		
Saturday, May 30. Morning of the seventh day of the week ..	i.	5	8	0	A. M.	Sunrise.
	ii.	6	16	40		
	iii.	7	25	20		
	iv.	8	34	0		
	v.	9	42	40		
	vi.	10	51	20		
	vii.	12	0	0		Noon.
	viii.	1	8	40	P. M.	
	ix.	2	17	20		
	x.	3	26	0		
	xi.	4	34	40		
	xii.	5	43	20		
Saturday, May 30. Evening of the first day of the week	i.	6	52	0		Sunset.
	ii.	7	43	20		
	iii.	8	34	40		
	iv.	9	26	0		
	v.	10	17	20		
	vi.	11	8	40		
Sunday, May 31. The first day of the week from midnight ..	vii.	12	0	0	A. M.	Midnight.
	viii.	0	51	20		
	ix.	1	42	40		
	x.	2	34	0		
	xi.	3	25	20		
	xii.	4	16	40		
Sunday, May 31. Morning of the first day of the week	i.	5	8	0		Sunrise.

SECTION VI.—*On the exact amount of the addition made to the length of the day on the occasion of the first miracle.*

We may now proceed to inquire into the amount of the addition made to the length of the day on this first occasion.

It would answer no useful purpose, preliminary to this inquiry, to examine the various opinions of commentators on Scripture, ancient or modern in general*, or those of com-

* To judge of the opinion of Justin Martyr on this point, from his dialogue with Trypho the Jew; he must have understood the addition to the length of the day, which now took place, as one of 12 hours to 24, making up 36 in all: Καὶ μετὰ ταῦτα πάλιν τῆς γῆς ὑμῖν παραδοθείσης μετὰ

mentators and chronologers of modern times in particular. With respect to the latter at least, we apprehend the fact to be certain; that no one among them hitherto has ventured to recognise and admit the simple truth of this miracle, as we have represented it: or if they seem to admit it in words, that they do in reality retract the admission by never allowing, nor thinking of allowing, any practical effect and consequence to the simple truth of the miracle itself. It is notorious that no one has ever supposed the course and succession of time to have become any thing different, *after* this miracle and *by virtue of* this miracle, from what it was before. They may therefore have admitted the miracle in words, and in profession; but in reality they have *never* admitted it, because they have *never* allowed it any effect.

On this question however in general we may begin with observing: That forasmuch as it is to be collected from the Scriptural account of what passed on this occasion, that the moon was in the west at the same time when the sun was in the east, yet was not ready to set in the west until some time after the sun was already risen in the east; we are first of all bound to consider how long after sunrise the moon could still be visible in the west, on an occasion like this, on the morning next after the full. Astronomers reckon the mean length of the lunar day, at present, that is the interval between two consecutive passages of the moon over the same meridian in general, at 24 h. 53 m. of mean time: and that being the case at present, when the moon's mean motion is more accelerated than it was at the time of this miracle, and when it moves further to the east in the interval between one passage and another than it did then; it could not be

δυνάμεως τοσαύτης, ὡς καὶ τὸν ἥλιον θεάσασθαι ὑμᾶς προστάξει τοῦ ἀνδρὸς ἐκείνου τοῦ ἐπονομασθέντος τῷ Ἰησοῦ ὀνόματι σταθέντα ἐν τῷ οὐρανῷ, καὶ μὴ δύναντα μέχρι ὡρῶν τριακονταέξ[f].

The author of the Book of Ecclesiasticus supposed this one day to have been made equal to two: Did not the sun go back by his (Joshua's) means, and was not one day as long as two[g]? Josephus observes that the day was preternaturally lengthened on this occasion[h]; but in what manner he does not say; and we do not doubt but that his silence was intentional.

[f] Dialogus: Opp. 419. 9: cf. 378. 11. Thirlby, 1722.
[g] Chap. xlvi. 4: cf. xlviii. 23.
[h] Ant. Jud. v. i. 17.

quite so much as 24 h. 53 m. at the time of this miracle. For the climate of Judæa, and for the latitude of the ancient Jerusalem, we have been given to understand that there can never be more than half an hour's difference in mean time, between the rising of the sun, and the setting of the moon at the full; and *vice versa.* It is easy then to see, that if the sun was setting May 30, at 6 h. 52 m. P. M. apparent time, and the moon was even only just coming to the full about the same time; yet if the sun was rising May 31 at 5 h. 8 m. A. M. apparent time, the next morning, the moon might be setting half an hour later the same morning— i. e. not before 5 h. 38 m. A. M. apparent time at least.

The truth on this point indeed could not be ascertained without an express calculation, such as we ourselves have endeavoured to make; and the particulars of which we have given elsewhere[i]. It is however essential to this question that the circumstances of the case should be strictly taken into account. The moon was still visible at the time of this miracle; but only *in* a valley; and only to the eye of a spectator, who was commanding a view of the country and of the horizon in the west at the time, from rising ground; and from rising ground too of considerable elevation. It is exceedingly probable therefore, (in fact it is the natural conclusion from these premises,) that for the ordinary level and for the natural horizon of the circumjacent region, the moon was already set; and was visible only from the elevated ground under the walls of Gibeon.

Again, to judge of the actual place and position of the sun in the east, at the same point of time, we must attend in like manner to the precise words attributed in Scripture to Joshua[k], "Sun, stand thou still" (literally, "Be dumb") "upon Gibeon, and thou moon in the valley of Ajalon." In this version of the original a different preposition is used in these two cases respectively: *upon,* in reference to the place of the sun, *in,* in reference to that of the moon. But in the Hebrew the same preposition is used in reference to each; and one which answers to our own of *in,* not to our own of *upon*.

It is much to be regretted that the authorised version did

i Appendix to the last volume. k x. 12.

not attend to this distinction, and did not conform itself strictly in this instance to the literal meaning of the Hebrew. For the distinction is not trifling: especially with reference to the question which we are considering. The moon, actually *in* a valley or depression of the surface of the country, could not be otherwise addressed. The sun, as actually so addressed also, must have been *in* Gibeon too, in some sense or other; or must have appeared to be so; must have been so situated, at the same moment of time, relatively to Gibeon, as to appear to the eye of a spectator in the immediate vicinity of Gibeon, as if just emerging *from the midst of Gibeon;* and therefore previously as it were *in* Gibeon. The Hebrew has a preposition which answers to *upon* in English; (to ὑπὲρ in Greek, or to *super* in Latin;) and one which might have been used in this instance, as much as that which answers to our's of *in;* and no doubt one which would have been, if it could have been so used with propriety.

Now Gibeon being a large city, (like one of the royal cities,) surrounded with walls and battlements of considerable height; being situated moreover on an eminence, (from which circumstance it derived its name;) it is self-evident that for the sun to be visible, from the vicinity of this city where the battle was going on, just rising out of the midst of it, just clearing its walls, but not yet above them, it must have been sometime risen, and it must have attained to a certain elevation in the sky itself; which, under the circumstances of the case, it may very well be presumed could not have been less than 15°; and therefore could not have been attained to by the sun in less than an hour after it had risen. And this being assumed to have been the actual state of the case, when those words of Joshua were addressed to it; it is evident that the precise time of the miracle would thereby be determined to an hour of mean time after sunrise, on the morning of May 31.

It may be objected however, that when declaring the effect which ensued on those words Scripture speaks expressly of the sun's standing still in the *midst* of heaven: "So the sun stood still in the midst of heaven[k]:" and the *midst* of heaven, it may be said, must denote the *meridian;* and

[k] x. 13.

therefore determine the time of the miracle to the point of noon. To this objection we reply that, if there is any ambiguity in this declaration, it must be ascribed to the English translation. It does not appear in the original. The word which is rendered by *midst* means the *half-part* or middle point of any thing which is capable of division or of bisection. Literally rendered therefore, the declaration is, "So the sun stood still (was dumb) in *half-part* of the "heavens."

Now "the heavens" is an appellative term of very extensive application in Hebrew: but its first and simplest and most proper meaning even in that language is to designate that open space by which the earth is every where surrounded; the atmosphere or firmament, which extends or seems to extend from the surface of the earth to the region of the planets and of the fixed stars; and, taken together with that portion of space which is occupied by the earth, appears to the eye of sense to make up the entire complex of visible space. As intended of the heavens in this most general sense, the words *half-part* of the heavens can denote nothing with so much propriety as the horizontal circle, which every where divides the open space in question into two great halves or semicircles: and by the use of this word, and by thus designating and defining the place of the sun, at the time of the miracle, as critically situated nearer the half-part of the heavens, in the sense of the horizontal circle, than any where else, Scripture has expressed itself with philosophical exactness, and with an attention to propriety of thought and of language, for which even its friends, and the believers in that inspiration under the influence of which it has both thought and spoken perpetually, have never hitherto given it credit.

The precise time of the miracle then being thus circumscribed and defined by the place of the sun in the east, and by that of the moon in the west, and by every other circumstantial criterion of the truth on this point which has yet been adduced; there can be no reasonable objection, in our opinion, to the conclusion that it must have taken place exactly at 6 A. M. of mean time, on this morning of May 31; which in kairic or apparent time, (allowance being made for

the equation of time,) would be reckoned about 6h. 11m. 22sec. A. M.; about one hour of mean time after sunrise, on this same morning, and about two hours after the arrival of Joshua, and the beginning of the battle of Gibeon.

And this leads us to observe that, to judge from the place in the context, assigned to the words addressed to the sun and the moon on this occasion[l]; the battle must not only have been begun, before they could have been pronounced, but in a great measure over. And if it had been going on two hours previously, it might well have been decided by that time; especially, as according to the assurance given to Joshua before the battle itself, "not a man of his enemies was to stand before him[m]." But though the contest might be already decided, and the victory be won, by 6 A. M. this day; the pursuit would still remain, to make the victory complete: and it is morally certain, (as we hope to shew by and by,) that it was more for the sake of the pursuit than for the sake of the battle, that Joshua was moved to utter those memorable words; which had the effect of lengthening out not merely *the day*, but the *morning* of the day; i. e. the most favourable part of the day for a long and laborious pursuit.

We are now in a better condition to estimate the exact meaning of those words of Holy Writ itself, which define and declare the amount of the addition actually made to the day on this occasion; and thereby of themselves return the true answer to the question which we are employed in considering: "So the sun stood still in the midst of heaven, and hasted not to go down about a whole day[n]."

We have here also something to object to the accuracy of the authorized version. In the first place, it is not proper to render the verb, which expresses the moving on of the sun, by *going down*. That would imply that the sun was previously stationary on the meridian; from which if it moved at all in the natural order of its course, it must be by descending or going down towards the west. But in the original the word is simply *la bouah, to go:* and that might be used indifferently of the sun's motion in either direction, either upwards from the horizon towards the meridian, or downwards from the meridian towards the horizon. It is

[l] x. 10, 11, 12. [m] Ib. 8. [n] Ib. 13.

manifest that, so far as the mere use of such a word is concerned, whether motion upwards or motion downwards is really intended thereby must depend on the circumstances of the case; and in the present instance these circumstances are such, that motion downwards, (the sun being previously only 15° above the horizon in the east,) must be entirely out of the question. Nothing could be intended but motion upwards *towards* the meridian, when the sun began to move again at all.

In the next place, it is not correct to render the latter part of the same clause, "about a whole day." It ought to be rendered, "after a perfect day:" "So the sun stood still in half-part of the heavens, and hasted not to go on after a perfect day."

It is the intention and meaning of this peculiar manner of describing the effect which ensued, to imply that this *solstice*, this standing still of the sun in space, without moving upwards as usual at that time of the day, in point of duration was *after* (or according to) "the scale and proportion of a perfect day." But what are we to understand by a perfect day? We answer, An equinoctial day. The perfect day is that which is just equal to the night; and the perfect night is that which is just equal to the day: and each part of which is just equal to twelve hours of mean time alike. Such was the proportion established by the Creator himself between the first night and the first day; when he divided the light from the darkness, and when he called the light day and the darkness night[o]: and the proportion of the first actual night to the first actual day, or *vice versa*, must determine that of every subsequent night to every subsequent day, in the abstract at least. Such is the proportion implied in the noctidiurnal cycle itself, as every where made up of one night and of one day; and as every where measured or measurable by the same period of twenty-four hours of mean time, comprehending both; and as every where divisible between both, but so that one half of the whole properly belongs to day, and the other as properly to night. Excess is as much opposed to the standard of perfection as defect. It is not, and cannot be, a perfect day as day, which exceeds the night as the

[o] Gen. i. 4, 5.

night; nor a perfect night as night which exceeds the day as day. We are persuaded therefore that, in measuring and defining the length of this solstice by comparison of it with such a standard of reference as the duration of a perfect day, Scripture had in view an equinoctial day: and having such a standard of reference as that in its eye, it is impossible that it could have expressed itself more intelligibly or more philosophically in this case too, than it is seen actually to have done.

The context confirms these conclusions, by the account of subsequent particulars. The battle which we have supposed to have begun about 4h. 11m. A. M. of apparent time, and to have been already decided about 6h. 11m. of the same, was drawn away, it appears, by the pursuit, from Gibeon, (the original scene of action,) in one direction to Beth-horon, and in another to Azekah and Makkedah[p]. And we may further collect, that the time of the arrival at Makkedah[q], (when the five kings were found in the cave,) was just about the time also when the sun, after standing still for this perfect day, must have begun to move upwards again. For now it is, that evening is first mentioned as still to come[r]; when allusion is made to the hanging of the five kings on five trees; and in due course of time afterwards, to the actual going down of the sun[s]; that is, to the actual arrival of sunset, when it became necessary to take their bodies down from those trees, agreeably to the command of Moses in such cases[t]; not until evening it is true, yet before the sun should actually have set.

It is clear then, that between Joshua x. 16. and 26, 27, the sun had begun to resume its course, and the day to proceed as usual; yet Joshua and part of the army were now at Makkedah. Let any one therefore measure the distance from Gibeon to Makkedah, on the best maps of ancient Palestine. According to D'Anville's, even by line, it must have amounted to sixteen Roman miles; and by road, it must have been eighteen at least. But let us assume it at sixteen Roman miles only = 12·8 of our own. It is self-evident that if the scene of action, and a great part of the

p x. 10, 11. 19–21. q 16–21, 22–26. r 26. s 27. t Deuter. xxi. 23. Cf. Joshua viii. 29.

army of Joshua, were to be drawn off from Gibeon, where they were at 6 A. M. in the morning of this day, twelve or thirteen English miles distant, as far as Makkedah; in the natural course of things it would require twelve hours or the principal part of twelve for that purpose.

The distance was almost as great from Gibeon to Beth-horon, ten Roman miles direct at least; in the direction of which the other part of the army was led by the pursuit; and where this part appears to have arrived much about the same time, as Joshua and the other half at Makkedah. Even after the arrival at Makkedah, there was time to attack and to take and to destroy it, the same day[u]. All circumstances therefore considered, it is not possible to suppose a less addition to have been made to the length of this one day, than twelve hours of mean solar time. The events of the entire day, beginning at Gibeon with the battle in the morning, and ending at Makkedah with what was there done in the evening, do not admit of being comprehended in less than twenty-four hours of mean solar time.

Indeed the mere fact of an extraordinary addition to the length of some one day at all, (if the relative proportion of the parts of the noctidiurnal cycle to each other, from the first until then, was to be preserved in any thing like its original integrity,) would presuppose and imply an addition of twelve hours or of twenty-four: that is, of half the proper measure of such a cycle, or of the whole of it. And this consideration too must have its weight (and no slight weight) in determining the precise time of the addition, so made, as well as the precise amount of it; and if it fixes the latter to twelve hours of mean solar time, it must fix the former to 6 A. M. of mean time too.

We may come then to the conclusion, that the date of this first miracle, affecting the course and succession of time according to its usual measures and usual laws until then, (this solstice of Joshua,) was the first day of the hebdomadal cycle, twenty-four hours and upwards after the full of the moon; May 31, at 6 A. M. B. C. 1520; that the solstice lasted a perfect day, in the sense of an equinoctial day; consequently that the sun began to move again at what would

[u] x. 28.

have been 6 P. M. of mean time, if nothing of this kind had happened; but under the circumstances of the case, at what must be considered as still 6. A. M. of *mean* time, though not in the same sense as before. Consequently, that twelve hours of mean time thus became, *de facto* and *bona fide*, part of the day as such, which must otherwise have been part of the night; twelve hours thus came to make part of the preceding noctidiurnal cycle, which must otherwise have made part of the next*.

CHAPTER III.

On the second Miracle of Scripture, affecting the sun; or the Retrogradation of the Sun, in the time of Hezekiah.

SECTION I.—*Whether a second miracle like this was not to be expected some time or other, if one like the former had preceded it.*

Preliminary to our proposed inquiries into the time and the circumstances of the second miracle of Scripture, we may begin with observing, That if an addition of twelve hours of mean time to the length of the natural day was really made on any former occasion, then, (although in a matter which concerns the Divine apprehension of the reason of things, and of the connection of one extraordinary interposition of this kind with another, and not our own, it becomes us to speak with all humility and all possible distrust of our own judgment,) it may perhaps be permitted us to say, that in this fact, and in this consideration alone, there would be foundation sufficient, on which to ground

* In illustration of these subjects, we may remark further that even the hail storm, encountered by the routed Canaanites, in their escape from Gibeon to Bethhoron, Azekah, and Makkedah[x], though undoubtedly resolvable into a direct interposition of Providence, would not be so much out of the usual course of nature, even for the climate of Judæa, on May 31, thirty-seven or thirty-eight days before the summer solstice, as it must have been at a later date, and nearer to midsummer.

[x] Joshua x. 11.

an expectation *a priori* that the same kind of miracle some time or other would be repeated.

For it cannot be denied that the effect of such an addition must have been to disturb the relation of the mean and of the actual cycle of day and night one to the other; which had never been disturbed until then. The actual cycle until then had been constantly proportional to the mean: and the same period of twenty-four hours in its turn had been proportionably applicable to both. The epoch of both until then, referred to the primitive rule, had been the same. But now, and by virtue of this addition to the length of one actual cycle, the relation between them, (that of one to the other and of each to the same thing distinct from both,) had been entirely changed. The actual cycle was still beginning at sunset; but the mean was now beginning at sunrise: the first hour of the former was the thirteenth of the latter, and *vice versa.* The same period of twenty-four hours reckoned perpetually from the first was coinciding half with the one and half with the other. Twelve hours of it belonged to the mean, and twelve to the actual.

A relation of disparity like this between the mean and the actual standard of the simplest and most elementary of the measures of time, a relation so contrary to what had existed from the first until then, so repugnant to analogy and the reason of things, not to add to the appointments and prescriptions of the Author of the cycle himself, (with submission and diffidence be it spoken,) we might almost venture to say would some time or other be found to be corrected: and if so, by another departure from the established order of things, so far analogous to the former in the days of Joshua, as to consist in a second addition of twelve hours to the length of the natural day, but so far supplementary to it also, as to complete the effect which had been only partially brought about by that; viz. a temporary change in the laws of time, or of the mode of their operation, permitted in both for wise and sufficient reasons, without any permanent alteration of either.

One entire period of 24 hours of mean time, which must otherwise have belonged to some one entire mean cycle of night and day, would thus be merged and absorbed in some

one actual cycle of night and day; and would be absorbed and lost for ever. But with this exception only, the original proportion of the period of 24 hours to the noctidiurnal cycle, would be restored; and through that, that of the mean to the actual cycle of night and day also. Both would again begin to proceed in conjunction, as they had done at first: both would again bear date in common from the same primitive epoch of sunset: both would be coincident, within the same limits as before, with the diurnal rotation from the mean sun to the mean sun again perpetually; and both would again begin to be measurable, in the same way and within the same limits, by the period of 24 hours, as they had been at first. In one word; the repetition of the miracle, which had once already taken place, (saving and excepting that one effect which has just been mentioned, of the permanent absorption of some one period of 24 hours in some other of 48,) would be virtually to undo the effect of its first performance, and to place the relations of time, in themselves and with reference to every thing else, in the same state in which they must always have been, had no such thing as either of these miracles ever come to pass.

SECTION II.—*Confirmation of this* a priori *probability by the Scriptural account of the origin of the second miracle.*

These considerations might have prepared us perhaps to expect a repetition of the same kind of miracle some time or other. And as far as we are able and as far as we are authorized to judge of the miraculous operations recorded in Scripture, further than has been expressly revealed by Scripture itself, the expectation thus raised appears to be confirmed, (and thereby to be shewn to be only reasonable and natural in itself,) by what is recorded in Holy Writ also of the moving cause and origination, of the first design and conception, of the actual miracle in the time of Hezekiah.

The passages of Scripture, which require to be compared in order to draw from them the necessary inferences on this point, are noted in the margin[y]. The first remark which we may make upon them is *this;* There is a difference between

[y] 2 Kings xx. 1, 2, 3; 4–5; 7, 8–10, 11: Isaiah xxxviii. 1, 2, 3; 4–6; 7, 8; 21, 22: 2 Chron. xxxii. 24. 31.

the proximate cause assigned to this second miracle, and that which was assigned to the former. For any thing which is declared to the contrary, the first conception of the miraculous effect on the former occasion must have originated with Joshua. He is represented at least as having acted so entirely of his own motion, and so independently of any impulse but that of his own will, when he addressed those words to the sun; that, while it is asserted in Scripture that there was no day like that before or after it, the essence of the distinction, which characterised this *one* day above all others before and after it, is made to reside in the circumstance that "the Lord, on that day, hearkened to the voice of a man[z];" not simply that this day had been signalized above all others by the nature of the miracle wrought upon it, but that a man had willed, and a man had even appeared of his own proper impulse to *command*, so stupendous a miracle on *this* day, and yet that God had given effect to the command, and had wrought it accordingly, on that day.

Truly in this sense it may well be supposed that there never was a day like this before; and it is still more certain that there is none upon record like this after it. Or else with regard to the miraculous operation of the day itself; one miracle is the same as another to Omnipotence. There can be no difference of greater or of less in any case of this kind with respect to the Agent, whatsoever there may be in our own apprehension and our own judgment of such things with respect to that which is done. And great and stupendous as this solstice of Joshua might be, whether in itself or according to our own estimation of the effect; requiring as it might the concurrent agency and direction both of Omniscience and of Omnipotence in a thousand ways more than could possibly appear on the face of the effect; active as it must have been in every atom of the material structure of this terraqueous globe, and of every animate and of every inanimate being and substance in it or upon it, yet without being for a moment perceptible by any; pervading it might be the whole solar system of which our own earth forms a part, and propagated possibly through that, and through the

[z] Joshua x. 14.

relations of that system to others, numerically distinct from itself yet indissolubly connected with it, to the utmost bounds of space: was it more wonderful than the first act of creation itself? was it a more signal display of Infinite Power and Wisdom, to stop the rotation of the earth on its own axis for twelve hours, than to give it the impulse of rotation itself, and to project it round the sun?

There was some day then among the days of the past, and consequently *before* this, the work and effect of which even to our own apprehension must appear to have surpassed that of this. The characteristic distinction of this day therefore must be restricted to that which is assigned it by Scripture itself; that the Lord, on this day and even in the great work of this day, had hearkened to the voice of a man: for which it alleges this further reason, "for the Lord fought for Israel:" the meaning of which allegation appears to us to be that, whatsoever even human prudence and forethought might have suggested to Joshua, or to any other human agent placed in the same circumstances as Joshua at this time, as necessary or even as desirable to complete the success of this day; to that the Lord, as fighting *with* Israel and *for* Israel, would have been pleased to give effect.

Now the battle at Gibeon, as we have seen, had been decided, and the victory had been won, before these words were spoken: but the pursuit remained; without which the rout and destruction of the enemy would not have been complete. And this, as we have also concluded, was just beginning at the moment of the appearance of the sun, emerging from the midst of Gibeon: and it might be foreseen that it must be continued through the day. It is probable therefore that what any victorious general, just preparing to commence a long and laborious pursuit of a routed enemy, in the morning of a summer's day, would naturally have desired, and, had his ability been equal to his wish, would naturally have effected, for himself, viz. the prolongation of the morning of the day for the sake of the pursuit; it is probable we say that this very same consideration was the motive which induced Joshua to pronounce those words at this moment. If with a strong conviction of the desirableness of such an effect, he uttered these words of

command to the sun with an equally strong and undoubting assurance of the effect to follow; that must be attributed to his faith. It pleased the Almighty to attest and seal his approbation of his motive, whatsoever it was, by giving power and effect to his words: and as he cooperated with Joshua and the Israelites in the course of the pursuit, by casting down stones from heaven on the heads of the devoted Canaanites, and by destroying more himself in that manner than fell by the swords of their pursuers; so did he at the beginning of the pursuit, by stopping the morning in its progress, not before there was daylight enough for the sake of the pursuit, but long before the usual time of the heat and fatigue of the day.

But with regard to the second miracle; the first conception of such a miraculous phenomenon, the idea of what now took place, did not originate with Hezekiah. We are bound indeed to infer from the letter of the narrative, that having received through the prophet Isaiah the answer to his prayer, and the assurance that he should not only recover from his sickness, but also on the third day go up to the house of the Lord, he must have inquired, (and in fact he is represented to have inquired,) what was the sign, that he should go up to the house of the Lord? Some sign then he must have considered desirable, or even necessary; and therefore he might have expected; and so far he may be said to have acted of his own suggestion in giving occasion to what ensued. But still, in any case, it is clear that he put this inquiry as one asking for information; as one ignorant as yet what this sign should be: certainly not as one who expected a particular sign, or was asking for a particular sign, and for none else.

Let us attend then to the answer returned to this interrogation. It is not now said to Hezekiah, as it had once before been said to his father Ahaz[a]—Ask thee a sign (i. e. for thyself)—ask it either in the depth, or in the height above—but simply, "Shall the shadow go forward ten degrees? or shall it go back ten degrees?" The effect then about to ensue was not left to the choice of Hezekiah, except in the shape of an alternative. It was defined and prescribed

[a] Isaiah vii. 11.

beforehand; so far at least that one of two things it must be, either a retrograde movement of the shadow, or a forward movement of the shadow, over ten degrees of the dial; each of them equally contrary to its natural order or its natural rate of motion. Nothing was left to Hezekiah except to decide which it should be: and whichsoever alternative he might have preferred, we cannot or ought not to doubt it was the Divine intention at the time to give effect to it alike; and in all probability the *same* effect, though possibly brought about in a different way.

Permission to fix on a sign had been given before to Ahaz the father of Hezekiah[a]; and Ahaz had been expected to specify a sign; and because he had declined to do so, he had incurred a direct reproof: he had been charged with wearying God[b]; that is, trifling with his patience, or abusing his indulgence. Had it occurred to Ahaz, under such circumstances, to ask even for such a sign as the solstice of Joshua, can it be questioned that it would have been granted him? But the event proved that the proper time for the repetition of this miracle was not yet arrived, when this option was given to Ahaz; that Ahaz, as left to his own discretion, did not think of asking either for that or for any other; and that the Lord Jehovah did not see fit as yet to vouchsafe it of his own accord.

In the present instance the state of the case is reversed. Hezekiah inquires about a sign; but the Lord himself proposes one, and such a sign as bears on its own face the stamp of a clear and indisputable likeness to the great miracle of the time of Joshua; one at least which contemplated as direct an affection of the sun on this occasion as that had produced on the former.

We may infer then, (though with all humility and distrust of our own judgment,) that the miracle about to follow was always designed to take place sometime or other; that this was the moment prescribed beforehand, in the Divine anticipation of the event, for its coming to pass; that the sickness of Hezekiah, out of which it might seem to have arisen, was only the contingent, that is, the proximate or immediate cause of its happening; that its true cause is to be sought

[a] Isaiah vii. 11. [b] 12, 13.

for in the similar miracle of former time, and in the anomaly which had thereby been introduced into the relations and proportions of time, which it was now intended to rectify and redress. Nor did it in the slightest degree interfere with this ulterior end and purpose of the dispensation, that it served at the same time, and even ostensibly and primarily, as a sign to Hezekiah himself; to confirm his reliance on the truth of the Divine promise not only of his recovery from his present sickness, but of the addition which was to be made to the length of his life.

Section III.—*On the circumstantial criteria of the second miracle.* i. *The degrees of the sun.*

Now the probability beforehand of the ultimate reference of this miracle, and of the connection thereby established between it and the former one, is of great importance to this question of the first of the criteria of the time and circumstances of the miracle itself; by enabling us to form a more correct idea of what must be understood by those degrees of the sun, in the anticipation of ten of which not yet arrived, or in the restoration of ten of which already past, the essence of the miracle was intended to consist.

For if twelve hours of mean time had been added to the length of the day on the former occasion, and this effect was about to be repeated on the present, those ten degrees of the sun, or degrees of the dial, cannot possibly mean any thing but ten hours of kairic or temporary time, which under the circumstances of the case must have been calculated in some manner or other, and must have been intended, to represent twelve hours of mean.

In the original this word is *maaloth:* and the meaning of *maaloth* in Hebrew is steps, or progressions: and degrees, as applied to the dial, in the proper use and proper signification of such a term in connection with such a subject, mean nothing but steps and progressions also. It is the end and design of the sundial to define and mark the motion of the sun in the heavens, which constitutes kairic or apparent time: and it does this by means of a style or gnomon, erected in the centre of the plate, (vertically in the dials of former times, as it is supposed, parallel to the axis of the earth in

those of modern; but in either case equally capable of projecting a shadow, when exposed to the light of the sun; which shadow follows the course of the sun all round the dial-plate.) The degrees or spaces on the surface of the dial-plate, traversed successively by this shadow, from morning to noon and from noon to sunset, answer to the actual degrees or spaces traversed by the sun in the heavens, from morning to noon and from noon to sunset also. And every twelve such degrees on the surface of the dial-plate, equally divided or proportionally according to the season of the year, are competent to represent the twelve hours of solar time, which at all seasons of the year, according to the ancient division of the day, made up the interval between the first appearance of the sun in the morning, when its rays first fell on the gnomon of the dial, to its last appearance in the evening, when they impinged upon it for the last time too; that is, the interval of the natural day. Each of these hours, so marked on the dial and so traversed by the shadow of the gnomon perpetually, has a proportional space in the heavens corresponding to itself, traversed by the sun in the same time: and if one of these could properly be called steps or progressions, that is, *degrees*, the other might be so too with just the same propriety; only that in one of these cases they would be more truly degrees of the dial, and in the other degrees of the sun*.

* We apprehend that it cannot be necessary to prove that the dial, alluded to in the scriptural account of the second miracle under the name of the dial of Ahaz, was a sundial of some kind or other. Ahaz may be the name of its maker, or that of Ahaz the father of Hezekiah, who might have caused it to be constructed, and erected where it had been. This is a matter of no importance, and, as we may add, of no difficulty. The dial in either case must have been a sundial; though, whether like the ancient sundial in general, (according to the opinion of modern astronomers and chronologers at least,) it was provided with a vertical gnomon, or like the modern, it had the gnomon inclined at an angle to the surface of the plate, answering to the elevation of the pole for the particular latitude of Jerusalem—may be another question, about which every one is at liberty to think for himself.

The sundial, as we have seen[c], was very late in finding its way into public use at Rome; and even then it was borrowed from the Greeks. Among the Greeks, it lays claim to a much greater antiquity; yet even

c Supra, Diss. IV. ch. ii. sect. xiii. p. 210. sqq. note.

It follows however that, referred whether to the dial or to the sun, these ten degrees were and must have been ten hours of kairic or apparent time; the only kind of time which could be shewn by the sundial at all. And it will be a

among them not before the time of Anaximander of Miletus, cir. B. C. 570[d], or that of Anaximenes of Miletus, his disciple[e], B. C. 548. Diogenes Laertius[f] and Suidas[g] ascribe its invention or its introduction to the former; Pliny to the latter[h]: Umbrarum hanc rationem, et quam vocant gnomonicen, invenit Anaximenes Milesius Anaximandri de quo diximus discipulus: primusque horologium quod adpellant Sciothericum (from *σκία* and *θηρᾶν*, *σκιοθηρευτικὸν*) Lacedæmone ostendit.

It is agreed however that both the knowledge and the use of the sundial were much more ancient in the east. *Πόλον μὲν γὰρ καὶ γνώμονα*, observes Herodotus[i], *καὶ τὰ δυώδεκα μέρεα τῆς ἡμέρης παρὰ* Βαβυλωνίων *ἔμαθον οἱ* Ἕλληνες. The gnomon in this passage means the style, or gnomon, as we also call it, of the dial plate itself: *Γνώμων... καὶ τὸ ἐν τοῖς ἡλιοτροπίοις*[k]. Commentators however have been somewhat at a loss to understand the distinction thus made between the gnomon in this sense, and the pole, or *πόλος*. But if the gnomon was meant of the style, erected in the centre of the dial plate, of what could the *πόλος* be intended, except of the dial plate itself? which being circular or semicircular, all that we have to do is to inquire whether *πόλος* in Greek could have the sense of such a circle or a semicircle.

Now the Scholiast on Aristophanes observes[l], *Πόλον γὰρ οἱ παλαιοὶ οὐχ ὡς οἱ νεώτεροι σημεῖόν τι καὶ πέρας ἄξονος, ἀλλὰ τὸ περιέχον ἅπαν (ἐκάλουν)*. The name of pole then was originally given to every thing which surrounds us, particularly to the atmosphere, that is, to the entire circle of the air and heavens; from the same notion and analogy at bottom no doubt, according to which a certain description of soldiers, or patrole, or constabulary, of the republic at Athens, whose duties were limited to the precincts of Attica, were called *περίπολοι*.

In this sense of the atmosphere as a circle, it appears to be used by the comic poet Alexis in Athenæus[m];

Τὸ τοῦ πόλου τοῦ παντὸς ἡμισφαίριον.

The term being thus transferred to the circle, in the centre of which the gnomon was erected, it was next transferred to the dial in general, in the sense of *ἡλιοτρόπιον* or *ὡρολόγιον*. *Κατὰ δὲ τὴν ὀροφὴν πόλον, ἐκ τοῦ κατὰ τὴν Ἀχραδίνην ἀπομεμιμημένον ἡλιοτροπίου*[n].—*Ἐστὶ δὲ ἐν Ἐρυθραῖς καὶ Ἀθηνᾶς Πολιάδος ναὸς, καὶ ἄγαλμα ξύλου μεγέθει μέγα, καθήμενόν τε ἐπὶ θρόνου, καὶ*

d Fasti Hellenici, ad ann. 547.

e Ibid. in anno.

f Vita, lib. ii. cap. i. § iii. 1: cf. Euseb. Præp. Evang. x. 14. § 11. p. 540.

g In nomine: cf. in *Γνώμων* and *Ἡλιοτρόπιον*.

h H. N. ii. 78: cf. 74: and Macrobius, Somnium Scip. i. xx. p. 103, 104.

i ii. 109.

k Anecdota Græca (Bekkeri, 1814), i. 233. 17. in voce. Cf. Suidas, *Γνώμων* and *Ἡλιοτρόπιον*.

l Ad Aves, 179, 180. *Ὀρνίθων πόλος.*

m ii. 55.

n Athenæus, v. 42.

necessary inference from this fact, that the time of the miracle must have been later than the *tenth* hour of the day at least. The shadow had already passed over ten of these degrees when it was proposed to bring it back: and this

ἠλακάτην ἐν ἑκατέρᾳ τῶν χειρῶν ἔχει· καὶ ἐπὶ τῆς κεφαλῆς πόλον. τοῦτο Ἐνδοίου τέχνην καὶ ἄλλοις ἐτεκμαιρόμεθα εἶναι, καὶ ἐς τὴν ἐργασίαν ὁρῶντες ἔνδον τοῦ ἀγάλματος, καὶ οὐχ ἥκιστα ἐπὶ ταῖς χάρισί τε καὶ ὥραις[o].—Τὸ δὲ καλούμενον ὡρολόγιον ἢ που πόλον ἄν τις εἴποι, φήσαντος Ἀριστοφάνους ἐν Γηρυτάδῃ,

Πόλος ταῦτ' (leg. τάδ') ἐστιν· ἑκατοστὴν (εἶτα πόστην) ἥλιος τέτραπται; [p]

The history of the second miracle itself proves that there was a communication between Judæa and Babylon, older than the time of the miracle itself. The reigning king of Babylon, who sent to congratulate Hezekiah on his recovery from his sickness, sent also, at the same time, to inquire "about the wonder which was done in the land[q];" that is, the miracle. It would be purely gratuitous however to assume that the Jews or Hezekiah could have known nothing about the sundial, until they learnt it from the Babylonians; just as much as that the Babylonians could have known nothing of it, until they became acquainted with it through the Jews.

There are several allusions in Scripture, which in our opinion are much more probably to be referred to the ever varying proportions of the shadow of the sundial than to any thing else: and therefore prove that it was a familiar object long before the time of Hezekiah. Does any commentator doubt that in those words of the Catholic Epistle of St. James, Πᾶσα δόσις ἀγαθὴ καὶ πᾶν δώρημα τέλειον—(note the fine Greek hexameter presented in these words—) ἄνωθέν ἐστι καταβαῖνον, ἀπὸ τοῦ πατρὸς τῶν φώτων, παρ' ᾧ οὐκ ἔνι παραλλαγὴ ἢ τροπῆς ἀποσκίασμα[r], there is an allusion to this shadow as ever varying, ever turning about, and changing its appearance; as ever projected, but under different circumstances, from the style or gnomon; and as to one of the best known and most familiar objects in his time? Yet what is there to distinguish it from the following? "My days are like a shadow that declineth[s]."—I am gone like the shadow when it declineth[t]."—" Man is like to vanity, his days *are* as a shadow that passeth away[u]."

The same kind of allusion appears in the still more ancient book of Job: "As a servant earnestly desireth the shadow[x]." What shadow, we may ask? That which all solid and upright bodies cast as the day declines, and it draws nearer and nearer to sunset—

Majoresque cadunt altis de montibus umbræ—

Virgil. Eclog. i. 83.

or the shadow of the gnomon? of which the same fact holds good also; that

[o] Pausanias, vii. v. 4.
[p] Pollux, ix. v. 46. p. 1009. Cf. Dindorf, Aristophanis Fragm. 210.
[q] 2 Chron. xxxii. 31.
[r] i. 17.
[s] Ps. cii. 11. Cf. Job xiv. 2.
[t] Ps. cix. 23.
[u] cxliv. 4.
[x] vii. 2.

is a necessary argument that the proposition was made later than the tenth hour of the day in kairic time at least.

The miracle therefore, which happened directly after, most certainly happened towards the end of the natural day; that is towards evening or sunset, or what, under ordinary circumstances, would have been evening or sunset. And this fact being established of the miracle in the present instance, we perceive from it at once, that it is only thereby the more strikingly contrasted with the miracle which had preceded. For that certainly took place at or about sunrise, that is, the beginning of the natural day; this was about to take place about sunset, or the end of the same. And that is a perceptible circumstance of analogy, as well as of opposition, between them.

We perceive also that, as twelve hours of mean time had been actually added to the length of the natural day on the former occasion; so it was proposed to add not less than ten

it lengthens after the point of noon, and is longest at sunset, the natural terminator of the day, and therefore of the period of toil and labour.

The division of the day into hours might be borrowed by the Greeks from the Babylonians comparatively late; and yet be much older at Babylon, and in all parts of the east. We shall see hereafter that in Egypt in particular it was as old as B. C. 798 at least. In fact the origin of this division is lost in its antiquity; and the most probable account of it is that it was as old as men themselves. We know of no foundation for an opinion, or rather simple assertion, of Scaliger's[y], that *ssaah*, the word for hour in Hebrew or Chaldee, was unknown to that language in the sense of hour; and that it means a different thing in the Book of Daniel. No one would suspect that, from the use of the word itself in that Book, if he had not been so told by Scaliger. "Daniel was astonied for one hour[z]." The same hour was the thing fulfilled upon Nebuchadnezzar[a]: "Shall the same hour be cast into the midst of a burning fiery furnace[b]."—"In the same hour came forth fingers of a man's hand[c]."

Who can consider it probable that, if the Babylonians were in possession of the sun-dial at this very time, they had not also the division of noctidiurnal into kairic time, founded upon it? We hope to shew in due time that they were well acquainted with the distinction of mean and kairic time itself, in all probability long before the date of the second miracle of Scripture. Every astronomer at least is aware that there are dates of eclipses recorded at Babylon, still in existence, some years older than the date of this miracle; yet observed and recorded if not in mean time, which is not impossible, yet certainly in kairic.

[y] De Emendatione, i. 5. A. [z] iv. 19. [a] 33. [b] iii. 6. [c] v. 5.

hours of kairic time to it on this. Now kairic time necessarily differs from mean at all seasons of the natural year, but two; viz. the two equinoxes: and there are seasons of the year, for almost every climate, when ten hours of kairic time are equal to twelve of mean. But these seasons can be found only twice in the year also; once between the vernal equinox and the summer solstice, and again between the summer solstice and the autumnal equinox.

Judging therefore from these criteria, as far as they go, yet remembering always that the final end and effect even of this miracle was destined to be the same as that of the miracle in the time of Joshua; we may infer two things at least of its actual date: i. That it must have come to pass towards the evening of some day, when ten hours of kairic time were already past: ii. It must have come to pass, on this day and at this time of the day, at some season of the year when ten kairic hours for the climate of Judæa in some sense or other were equal to twelve of mean.

SECTION IV.—*On the circumstantial criteria of the second miracle.* ii. *The day of the week.*

Again, it appears from the account of this miracle that, whensoever it happened, it must have been *three* days before the usual time of some stated resort to the temple. Hezekiah was told by Isaiah that God would heal him, and that he should go up to the house of the Lord on the third day: and it was to confirm the assurance of this future fact more particularly, that the miracle itself, as a sign, was proposed. "Hezekiah also had said, What *is* the sign that I shall go up to the house of the Lord?"

Now the times of stated resort to the temple, (considered as something distinct from any daily attendance there at the hours of morning or of evening sacrifice, as hours of prayer,) were the sabbaths, the new moons [c], and the extraordinary feasts; by which we understand the Passover, Pentecost, and the feast of Tabernacles. This criterion therefore, as far as it is applicable, would determine the time of the miracle to one or other of these occasions: and if none of

[c] Isaiah i. 13, 14: Amos viii. 5: Hosea ii. 11: Ps. lxxxi. 3. Josephus, Ant. Jud. iii. x. 1: Bell. v. v. 7. Horace, Serm. i. ix. 69.

the extraordinary feasts, under the circumstances of the case, can be supposed to have been intended, the new moon of some month, or the ordinary sabbath, in all probability will turn out to be what was actually meant; but which, at present, we could not undertake to decide.

If the sabbath however was really intended, then to judge from the regular idiom of Holy Writ in such cases, (that is, in the use of such notes of time as these,) the day of the miracle must have been *two* days before the sabbath; and therefore the fifth day of the week: for there are many instances to be met with in Scripture of such statements as these, in which the third day from a certain time is nominally specified, and yet only one day's actual interval between the first and the third is really understood; the first day being included in such cases as well as the third. It was a rule of reckoning with the Jews that any part of a night-day, however little, was equivalent to the whole. On this principle only is it, as all commentators are agreed, that the three days' interval between the Crucifixion and the Resurrection either can be or is to be explained; because the former happened in reality late on the sixth day of the week, and the latter early on the morning of the first. It will be no difficulty therefore, should it turn out that the miracle itself came to pass on the fifth day of the week, and yet that the sabbath, next after it, in this allusion to it beforehand is spoken of as the third day after it.

SECTION V.—*On the circumstantial criteria of the second miracle.* iii. *The year of the reign of Hezekiah.*

A third criterion of the date of this miracle is the year of the reign of Hezekiah in which it must have happened.

On this point however we must be permitted to refer to our own inquiries into the chronology of the Old Testament. We have seen good reason to fix the accession of Hezekiah to the month of December, B. C. 725: and conjecturally even to the tenth day of December in that year, which coincided with the first day of the tenth Jewish month for the time being; the first of the month in after times called Tebeth.

The date of the miracle in terms of the years of his

reign is determined by Scripture itself to his 15th year. It appears that, at the time of the miracle, a promise was given him of an addition of 15 years to the length of his life; and consequently to the length of his reign. Now, according to Scripture also, he reigned only 29 years in all. If this promise therefore was fulfilled, (as we do not doubt it was,) it must have been given him in the middle year of his reign, the middle year of these 29 years; either 14 years complete after the beginning of his reign, and 15 current or complete before the end, or 14 years and six months after the beginning, and 14 years and six months or nearly so before the end.

This last in our opinion was the real state of the case. The fifteenth year of Hezekiah bearing date Tebeth 1, B. C. 711; if the miracle happened six months after that time, it happened about the end of the second month of the Jewish calendar, B. C. 710: the month which was afterwards called Jar. For, according to the regular rule and administration of this calendar, as may be seen from the calendar itself in our Prolegomena, B.C. 711—710 (= Period iii. cycle xii. *iii) was intercalary, and there was a second Adar that year; so that from Tebeth 1, the tenth month of the calendar, in Hezekiah's fifteenth year, B. C. 711, to Jar 30, the end of the second in the same, B. C. 710, the actual interval was six calendar lunar months; though in an ordinary or common year there could have been only five.

The language of the promise indeed did not necessarily imply that the addition, destined to be made to his reign, would be precisely 14 years six months, according to the calendar. There might be an intentional omission upon this point, as concerned the particular meaning of the promise, with a general assurance of its truth and a general comprehension of the sense in which it was to be understood. It would have been altogether unexampled, and contrary to the usual method of the dealings of Providence with all mankind in this one respect, to have made known so long beforehand even to Hezekiah the precise day of his death. The promise now made of an addition of 15 years both to the length of his life and to that of his reign, we may very well suppose, would have been worded in the same general way, what-

soever the particular addition might have been which it was the intention of the Author of the promise itself at the time to make; provided it was neither less than 14 years nor greater than 15 in all. Though therefore this criterion of the time of the miracle is not absolutely decisive, yet we are justified in considering it something which approaches very nearly to that character; on the strength of which we might venture to predict that the true time of the miracle would be more probably found about the middle of the 15th year of the reign of Hezekiah, than any where else in that year; and consequently at or about the end of Jar, B. C. 710.

SECTION VI.—*Application of the criteria thus determined to the date of the first miracle, May* 31, *considered as that of the second also.*

If the date of an event, like this second miracle of Scripture, were to be determined by *a priori* reasons of any kind, there could be no day in the Julian calendar, from the beginning to the end of a given year, which we could consider so likely beforehand to supply this date as the day of the first miracle of the same kind, the date of the solstice of Joshua, May 31.

This second miracle, as we have seen reason to conjecture, (though with all submission, and all diffidence in our own judgment,) in the design and purpose of its true Author, having a secret respect to that former one more than to any thing else; the time and the mode of its coming to pass being fixed and determined not by man but by God himself; this too in the contemplated effect and result of the miracle being destined to add 12 hours of mean time to the nocti-diurnal cycle in a particular instance, as that had done in the former one; *that* having been determined by the circumstances under which it occurred to the *morning* of the natural day, and *this*, as we have already discovered, by those under which it too was about to happen being determined in like manner to the *evening* of the natural day; what wonder would it be, under such circumstances of coincidence as these, if even the day of the month turned out to be the same on this occasion as it had been on the former?

Let us therefore be allowed to begin with applying the tests or criteria, already ascertained, of the true time and true date of this second miracle, to this particular Julian term May 31, already connected with a miraculous economy of this kind from as far back as B. C. 1520. If they are found to agree to it one after another, we apprehend that will be decisive proof of the truth; unless it could be shewn that even a coincidence like that could be purely the effect of chance.

Now the last of these tests or criterions of the true time and true date of the miracle appeared to be this: That whatsoever it was it must have been some day at or about the end of Jar, in the Jewish calendar for the time being, B. C. 710. This criterion holds good of May 31. The first of Nisan, B. C. 710, as our scheme of the Jewish calendar for that year demonstrates, cyclically reckoned and according to the rule of the calendar, fell on April 2 at 18 hours, or April 3 at midnight; and therefore the first of the second month (the first of Jar) fell on May 1 at 18 hours, May 2 at midnight; and Jar being a month of 30 days, the 30th of Jar fell on May 30 at 18 hours, May 31 at midnight. If the promise then made to Hezekiah was made on this day, and was ratified by the miracle on this day; it was both made and ratified, as we considered it to be most probable it was, at the middle point of his 15th year; 14 years and six months from the beginning of his reign.

We are now able to test the applicability of the second criterion, (that of the day of the week,) to this day, May 31, assumed to have been the true day of the miracle.

At such a time in the Jewish calendar as the end of Jar, it is evident that no such period of stated resort to the temple as that of one of the national festivals could be at hand, except that of the feast of Pentecost. The feast of Tabernacles would be still four or five months distant. The feast of the Passover and of the Azyma must have been past. At this period of the paschal rule of the Jewish church, the paschal terms were March 24 and April 22: and the Passover of this very year, B. C. 710, celebrated Nisan 14 according to rule, was celebrated on April 16.

Now the date of Pentecost, 49 days perpetually after

Nisan 16, was always a stated day, the sixth of the third month of the calendar reckoned from Nisan; the sixth of the month called Sivan, when the first was called Nisan and the second was called Jar. The sixth of Sivan this year fell upon June 6, six days after May 31. On this principle a stated resort to the temple, only three days after the miracle at the utmost, could not have been meant in this instance of the feast of Pentecost. The new moon of Sivan indeed would fall upon June 1: and the new moons of every month were days of stated resort to the temple also, and were solemnized by sacrifices and ceremonies peculiar to themselves. But June 1, the new moon of Sivan, was only the day after May 31 the last of Jar: and though the second day after that of the miracle, agreeably to the idiom of Scripture in such cases, might admit of being meant by the third day after it, the first day could not.

Besides this, it is to be considered that Hezekiah before these things happened was sick, and, as Scripture describes the nature of his sickness, sick unto death. It pleased God indeed graciously to recover him of this sickness; but it does not appear that he thought proper to do it all at once, nor even apparently in a miraculous manner. Isaiah, it is said, directed the king's physicians to lay a lump of figs on the boil; which was to have recourse to secondary means for effecting his recovery, and apparently very simple means too, which God nevertheless intended to bless and to render effectual: yet not all at once. Even such means were to be allowed time to act, in appearance at least. The προθεσμία specified for the *perfect* recovery was the *third* day; and the sensible proof to be given of it was the king's reappearance in public on that day, amidst the stated resort to the temple of worshippers on that day; and no doubt giving thanks publicly on that day for his recovery itself, thus sensibly attested by *his* presence in the temple upon that day, in the perfect enjoyment of health and strength, *who* only two days before had been at the point of death.

Let us inquire then whether the third day from the end of Jar, reckoned according to the idiom of Scripture, the day after the new moon of Sivan, had any particular sacredness of character to distinguish it, and to make it a day of

resort to the temple for the purpose of public worship. It is easy to see that if it had, and if it was neither a national feast day nor a new moon, it must have been a sabbath. It must have derived this sacredness of character from its coincidence with the sabbath.

The Julian date of Sivan 2 B. C. 710 was June 2, reckoned by the Julian rule from midnight. The dominical letter of the year was G. And when that is the case, in the common years of the Julian cycle of leap year June 2 is the feria septima or sabbath. For the same reason, May 31 is the feria 5ª or Thursday. On this principle, the date of the miracle in the hebdomadal cycle, being the feria 5ª, the date of the third day after it, according to the usual idiom of Scripture, would be the feria 7ª, in the same cycle; and necessarily a day of resort to the temple, because a sabbath.

These coincidences then as far as we have yet considered them are very decisive; and plainly conspire to designate May 31, B. C. 710, as the true Julian date of the miracle. We have still to inquire into the first criterion; that of the season of the year, and of the proportion of 10 hours of kairic time to 12 of mean; and into its applicability to this day also.

SECTION VII.—*On the proportion of kairic time to mean, May 31, B. C. 710, for the meridian of the ancient Jerusalem.*

B. C. 1520, the mean vernal equinox, according to our tables, for the meridian of Jerusalem falling out April 5, at 17 h. 47 m. 24 sec. from midnight; May 30, the day before the former miracle, was the 56th day after the equinox; and the sun was then rising at 5 h. 8 m. A. M. apparent time, (the effect of refraction not being taken into account; though that would be to make the sun visible two or three minutes sooner.)

B. C. 710, the mean vernal equinox for the same meridian was falling March 30 at 11 h. 7 m. 48 sec. from midnight. And the date of sunrise, 55 days after, May 24, being again assumed at about 5 h. 8 m. A. M. apparent time; seven days after, i. e. May 31, it may be assumed at about 5 h. 2 m. 30 sec. A. M. apparent time; exclusive of the effect of refraction. But as refraction, for the climate of Judæa, would

make a difference of about five minutes in the length of the whole day; it would make one of about 2 m. 30 sec. in the time of sunrise, as dated in kairic time from the first sensible appearance of the sun on the horizon in the morning. It may be assumed then that the first visible appearance of the sun on the morning of May 31, so produced, would be as nearly as possible 5 A. M. apparent time: the equation of time, at this period of the year, being negative and amounting to about 9 m. 32 sec.

The length of the whole day, on this principle, would be 14 hours of apparent solar time; and the length of the half day seven; and that of every hour of diurnal time 1 h. 10 m. of apparent solar time. The scheme of ὧραι καιρικαὶ therefore for this one day, May 31, B. C. 710, from sunrise to sunset, may be exhibited as follows:

Ὧραι καιρικαὶ, or scheme of diurnal time in kairic hours, from sunrise to sunset, May 31, B. C. 710, for the meridian of Jerusalem.

DAY.								NIGHT.			
Hours.	h.	m.		Hours.	h.	m.		Hour.	h.	m.	
i.	5	0	A. M. sunrise.	vii.	12	0	P. M.	i.	7	0	P. M. sunset.
ii.	6	10		viii.	1	10					
iii.	7	20		ix.	2	20					
iv.	8	30		x.	3	30					
v.	9	40		xi.	4	40					
vi.	10	50		xii.	5	50					

It is evident, from this scheme, that as every hour of diurnal time on this day was equal to 1 h. 10 m. of apparent solar time; ten hours would be equal to 11 h. 40 m. of such time: and that would be a close approximation to twelve hours, if not actually the same with it. The length of each of these hours would be just the same in mean solar time; and therefore the sum of the length of ten of them the same in mean time as in apparent. The only difference would be that, as reckoned in mean time, the first hour of day would begin to be current nine minutes earlier than as reckoned in apparent, and every other after it in the same proportion; and in like manner the first hour of night, and every subsequent one also.

Now it is by no means necessary to suppose that because Scripture speaks in this instance in express terms of ten

degrees, or ten maaloth, in the sense of ten hours of diurnal time; it means ten and ten only. In all languages, current terms are liable to be used as complete; and this is an idiom which, as every one knows or ought to know, is peculiarly characteristic of Holy Writ: so that though ten degrees, even in the sense of ten hours of diurnal time, are all which are actually mentioned, it is still open to question whether a little more or a little less than ten, as much as ten exactly, may not be actually meant.

Now the circumstances of the case themselves exclude the supposition of any thing less than ten. And in like manner the necessity of the case, in the present instance, implies a little more than ten. For if the final end of the dispensation was to add twelve hours of mean time to the length of the day, yet in and through these ten of kairic only; something more than ten hours of kairic time must have been denoted by these ten: for ten hours of kairic time, at this period of the natural year, as we have seen, would not be equal to twelve of mean. Nor is there any period in the natural year when, for the climate of Judæa, this could be the case: since even at the summer solstice, and including the effect of refraction at both extremes of the day, the utmost length of the day between sunrise and sunset is only 14 h. 12 m.; and every hour of such a day is only 1 h. 11 m. long at most: ten of which would certainly be equal to 11 h. 50 m. of mean or apparent time, but would still be ten minutes less than twelve; the actual amount required in the present instance.

The truth is, the dial of Ahaz, on which these maaloth or degrees are supposed to have been laid down, might very probably have been graduated for integral maaloth, but not necessarily for all the possible divisions or proportional parts of such maaloth, beyond quarters or thirds of each at the utmost. The third of one of these hours of the dial, May 31, B. C. 710, would be 23 m. 20 sec. of mean or of apparent time: and if, when the option between the two movements was proposed to Hezekiah, the shadow was already past the point of one of these maaloth, but not arrived even at the first of its subordinate divisions, especially if this maaloth was the last of the twelve in general; it is not easy to

conceive how, in a general allusion to the recession of the shadow, it could be spoken of otherwise than as one of *ten* degrees; though in reality the allusion to it might be intended of ten, and of nearly a third of one more. But the further prosecution of this question requires something to be said of another, to which we have not yet alluded.

SECTION VIII.—*Whether the recession of the sun on this occasion was gradual or instantaneous.*

The place of the sun in the heavens, at the time of the first miracle, having been about 15° above the horizon in the east; if it was kept stationary in that position for twelve hours of mean time, no one can (no one at least ought to) doubt that the actual motion of the earth about its axis, (which is the true physical cause of the apparent motion of the sun round the heavens,) must have been stopped and suspended for that length of time. To profess to admit the truth of the fact of the sun's standing still in one situation for such and such a length of time, yet to pretend to explain the fact itself on any principle but this; would be highly inconsistent, and even absurd. It would be much better to deny the fact *in toto*, than to endeavour to account for it in any manner which would admit the phenomenon in appearance, but deny it in reality.

In like manner, if the *locus* of the sun in the sky, at the time of the second miracle, was about 15° above the horizon in the west, and if it was set back at that time from this position in the west to a corresponding but opposite position in the east; the *modus operandi* in this instance, it must or it ought to be evident to our own reason and common sense, must have been by reversing the motion of the earth about its axis, and by giving it an impulse in the contrary direction. There could have been no stopping or suspending of this motion in this instance, as there had been in the former; but there must have been now, what there could not have been before, the substitution of a motion from east to west in the rotation of the earth round its own axis, instead of the motion which it always had until then from west to east. It would be just as unphilosophical as inconsistent with the testimony of

Scripture, to admit this phenomenon too, and yet to endeavour to explain it on any principle but that which is the only natural explanation of the fact, compatible with its reality. The eyes of all mankind, which witnessed this extraordinary phenomenon, wheresoever it was capable of being seen and witnessed at all, could not deceive them. They could not be deceived neither as to the place of the sun just before in the west, nor as to its place directly after in the east: and both being equally attested by the evidence of the senses every where, and consequently equally to be depended on as actual and real every where; what possible means could there be in any instance, of accounting for this change of its place from west to east, except one, which, if it produced such an appearance any where, must have produced it every where; viz. the reversing and turning into the opposite direction of the diurnal rotation from west to east? the necessary effect of which would be the reversing, and turning into the contrary direction also, of the motion of the heavens and of every thing the *locus* of which in space makes part of the heavens, from east to west.

On this point therefore we should consider all argument superfluous. The only question worth notice and requiring an answer would be this: whether, if an actual change of the place of the sun in the sky from west to east, and so brought about, now took place, this change of its place so effected was gradual or instantaneous? whether the sun, having just before been seen to be in the west, immediately after and all at once was perceived to be in the east? or whether it was observed to go gradually back from west to east, until it arrived at the point where it was destined to stop, and from which to retrace its steps once more towards the west, according to the usual law and to the usual direction of its diurnal motion? We may assume that to Omnipotence, (the Agent in either case,) one of these modes of producing the effect was just as possible as the other; and that the question *de facto* between them is to be determined only by the special reasons of the case.

Now in favour of this possible gradual restitution of the sun from its place in the west to the corresponding but op-

posite position in the east, it might be argued that ten maaloth, or ten degrees, being the limit proposed to the extent of the restitution—forasmuch as understood of ten diurnal or kairic hours these would be 20m. less than twelve hours of mean time; a gradual restitution of the sun from west to east, which took up 20 minutes of mean time and no more, would make up these ten hours of kairic time into twelve of mean exactly: and the addition thus made to the length of the day at last would be twelve hours of mean solar time also exactly. This argument at first sight is specious; and even conclusive. Yet there are serious objections to it; and one in particular, which will prove that the hypothesis, on which it proceeds, under the circumstances of the case, is inadmissible.

In the first place, it would be contrary to the rule and analogy of the diurnal rotation, particularly as the measure of time in its simplest and most elementary form of all, that any part of it, as a corresponding measure and part of time, should ever, or under any circumstances, since the measure of time by this standard began, have been performed except in one direction; viz. from west to east, as it is in reality, from east to west, as it seems to be perpetually. On this principle, an instantaneous restitution of the sun might be admissible; but a gradual one could not be.

Secondly, we must remind the reader of what was lately demonstrated relating to the cycle of the meridian restitution; for that is very intimately connected with the present question.

The right ascension of the equinoctial sun in the sense in which we explained it, viz. of its angular distance from the noctidiurnal epoch at the beginning of every year, as we observed at that time, once determined at the beginning of every tropical or natural year, remains the same to the end of that year. B. C. 1520, at the beginning of the year, this right ascension was 17 h. 47 m. 24 sec. in time, 266° 51′ 0″ in space or in angular motion; and it was still the same at the date of the first miracle May 31 that year. But the suspension of the motion of the heavens around the earth for twelve hours, which then took place, produced the same effect on this right ascension from that time forward for the rest of

the year, as if, at the beginning of the year, it had been reduced all at once by 12h. = 180°, that is, by half an entire revolution of the heavens.

B.C. 710, at the beginning of the year, this right ascension in like manner was 11 h. 7 m. 48 sec. in time, 166° 57′ 0″ in angular motion or space: and as it had been diminished 12 h. in time, 180° in space, or half a revolution, before by what then took place, so must it have required to be by what now took place; or the restitution of the cycle of meridians, at the end of its proper period of 4000 years, neither would nor could take place, *as* it did and *when* it did. It is true that, even on this supposition, one entire revolution of the heavens, (= 24 h. in time and 360° in space,) would be lost for ever out of the account of the right ascension of this equinoctial sun: but that would make no difference to the cycle of meridians, nor to its completion in its proper manner and at its proper time.

If then it was essential, (as it appears to have been,) for other reasons, that this meridian cycle, notwithstanding either of these miracles, should come round in the proper way and at the proper time; an instantaneous restitution of the sun on the second occasion would be the only economy of the miracle, compatible and consistent with this necessity of the cycle. For suppose the restitution gradual, or transacted in time; and that time itself not more than 20 minutes: this would make a difference of five degrees in space; which would make no part of the diminution of the right ascension of the equinoctial sun, produced by the miracle. That would be confined to the ten hours of kairic = 11 h. 40 m. of mean time; that is = 175° of space, but no more. The total diminution of right ascension then on both occasions would be only 180° + 175° or 355°, instead of 360°. And consequently the restitution of the cycle of meridians, which actually came to pass B. C. 4. A. M. 4001, never could have come to pass at that time at least.

We conclude then that the restitution of the sun on this occasion from the west to the east was instantaneous: and assuming that 19 min. had previously elapsed of the 12th hour of kairic time, we get the date of the restitution on this

principle 6 h. 9m. P. M. of apparent time, and that of its complete effect instantly after 6h. 9m. of apparent time also; the denomination of which in the style of diurnal would now be changed all at once from P.M. to A. M. And 6h. 9m. P. M. of apparent time being equal to 6h. P.M. of mean; in mean time the restitution must be dated exactly at 6 P. M. and its effect instantly after at 6 A.M.: just one hour of mean time after 5 A.M. the first hour of diurnal time on this day, as we have seen.

SECTION IX.—*General conclusion concerning the date of both the miracles; resulting from all the above premises.*

It thus appears that all our criteria of the time and of the circumstances of the second miracle, B. C. 710, meet together in the same Julian term this year, as those of the former did B. C. 1520: and this coincidence, (which is the spontaneous result of the circumstances of the case, in each instance,) ought in all reason to be allowed a weight of its own, in confirmation of, yet distinct from, every thing else to the same effect.

And yet we have not specified every thing which was really characteristic of this day on both occasions. For as May 31 on the former was the date of the day after the full moon; so May 31 on this was the date of the new moon. The second new moon in May, B. C. 710, (for there were two this year in this month,) is found by calculation to have fallen out about 2 P. M. for the meridian of Jerusalem, on May 31. So that if the moon at the full was more properly the subject concerned in the miracle of May 31, B. C. 1520, as far as it affected the moon; the moon of the conjunction was just as much the proper subject concerned in this of May 31, B.C. 710. On this coincidence however we shall have occasion to treat expressly hereafter.

It follows that the Julian date of each of these miracles, (the greatest and most remarkable to all human conception and all human estimation of such things, which human eyes ever witnessed,) was the same; that of the former, May 31 A.M. 2485 B.C. 1520, that of the latter May 31 A. M. 3295, B. C. 710, 810 years later: that both the true and the mean longitude of the sun, at the time of the former, was in the 25th of Taurus, at the time of the latter, was in the 1st of

Gemini*: that the moon, at the time of the former, was about 27 hours past the full, and at the time of the latter was about four hours past the conjunction: that the noctidiurnal time of the former was 6 A.M. of mean time, for the meridian of Jerusalem, and that of the latter was 6 P.M. of mean time for the same, the former the primitive epoch of sunrise, the latter that of sunset: that 12 hours were added to the natural day on the former occasion, and 12 on the latter, making up 24 in all: that the *modus operandi* on the former occasion was by suspending the diurnal rotation, and on the latter was by reversing it: that the extent of the reversion was 180°, or half an entire revolution of the heavens: that this effect was completed in an instant, and there was no appreciable interval between the appearance of the sun in the west just before, and its appearance in the opposite part of the heavens in the east directly after: that the right ascension of the equinoctial sun, or its angular distance from the noctidiurnal epoch, by the joint effect of both these miracles was diminished to the extent of 360°, or of one entire revolution of the heavens, but that the cycle of the meridian restitution was neither accelerated nor retarded by it in any the least degree.

SECTION X.—*On the effect of the two miracles on each of the measures of time.*

i. *On the noctidiurnal cycle.*

The mean cycle of night and day in theory may be distinguishable from the actual; but in point of fact and at a given time it cannot be considered a different thing from it. The relation established between these two cycles at first

		°	′	″
* B. C. 1520.				
May 31 at 6 A. M.	Sun's mean longitude	54	40	12·5
	Equation of the centre	−0	22	29·7
	Sun's true place	54	17	42·8
B. C. 710.		°	′	″
May 31 at 6 P. M.	Sun's mean longitude	60	50	46·8
	Equation of the centre	−0	8	49·4
	Sun's true place	60	41	57·4

was one of equality; and they differ from each other at any time so little, that they may be regarded at all times as the same.

The common measure of each of these cycles, (the middle term to which each is referrible perpetually, and the agreement of both with which makes either the same with the other,) is the period of 24 hours of mean time; not the same numerical period, (for that in the nature of things is impossible,) but a similar period, a succession of such periods, each of them 24 hours in length; one of which no sooner comes to an end than another begins, and continues the same succession in the same way.

The proper epoch of the first of these periods having been the proper epoch of both the first actual and of the first mean noctidiurnal cycle; as long as the period itself went on in conjunction with both, (identical with itself yet equally applicable to each of them, and in point of fact equally applied to each,) so long it was impossible that they could differ one from the other; at least beyond certain limits, and those too insignificant to be taken practically into account.

Now (as a moment's reflection will serve to convince us) the actual cycle of night and day could not have been affected by either of the miracles. The actual succession of night and day could not have gone on after either in any manner, externally and sensibly, different from that in which it had been seen to be going on before. If it was the alternation of darkness and light after a certain order before, it was so still. If it was bearing date from sunset before, it continued to do so still. If it was the actual revolution of the earth from the actual sun to the actual sun again before, and if its proper measure was the measure of that revolution before, it was so still.

It is manifest therefore that sensibly and in appearance no change whatsoever was made in this cycle by either of the miracles; nor even any physically and in reality—if the actual cycle of night and day under whatsoever circumstances is still the actual revolution of the earth from the sun to the sun again, regulated by whatsoever law it may be. The ordinary law of this revolution is the average period of 24

hours. But it might have been a period of 36, or one of 48 hours; and the revolution in question, defined and understood as just stated, would still have been the same thing in itself.

The proper effect therefore of each of the miracles on the cycle of night and day was produced on the relation of the period of 24 hours to each of these cycles, the mean and the actual, respectively. This period had accompanied both and measured both down to the time of the first miracle; but it could not continue to accompany both and to measure both in the same manner after that miracle as before. This might be possible, (it might at least be conceivable,) of the mean cycle: but it would not be even conceivable of the actual. The current actual cycle at the time of the miracle having absorbed not only the 24 hours which properly belonged to it, but also 12 hours of the next to that; it is manifest that the uniform applicability of the period of this kind to the actual cycle of night and day, according to the same law as at first, was no longer practicable. If this period continued to accompany the actual cycle from this time forward, it must be in a different form; i. e. in a new succession and cycle of its own kind, each integral member of which could contain only 12 hours of one of the old. And did we go back to the beginning of things, to find the proper epoch of this new succession in terms of the old, and to bring it down from the first in a state of commensurability to the actual cycle of night and day after the first miracle as much as before; we should be obliged to fix this epoch at the middle point of the first such period of the old: or what amounts to the same thing, in tracing this new succession of periods of 24 hours from the same absolute epoch as at first, we should be obliged to begin with allowing the first of these periods 36 hours instead of 24, dated from the original epoch; as not more than equivalent to the first actual cycle of night and day, including the anomaly produced by the first miracle, yet dated from the same epoch also.

The effect thus produced by the first miracle on the relation of this period to the actual cycle of night and day, it is manifest, would be repeated by the second; and the joint effect of both would be *this;* viz. To restore indeed the com-

mensurability of the period of 24 hours and of the noctidiurnal cycle one with the other from that time forward, the same as before; but to render it impossible that any actual cycle of night and day from that time forward should be measured or measurable by any actual period of 24 hours, by which it must have been measured or measurable if neither of these miracles had happened. No integral period of this kind, from the time when the effect of both the miracles was complete, as the proper measure of any actual cycle of night and day for the time being, could contain a particle of mean time, such as must otherwise have belonged to it and to the same cycle of night and day conjointly, if neither of the miracles had happened. And to find the epoch of this new succession of such periods too in terms of the old, and to bring it down in a state of commensurability with the actual cycle of night and day, after the completion of both the miracles as much as before; there would be no alternative but to assume the first period of the new succession 24 hours later than the first of the old: or what amounts to the same thing, but to consider the first period of this description in the old succession, corresponding to the first actual cycle of night and day, as a period of 48 hours instead of 24.

Section XI.—ii. *On the hebdomadal cycle.*

The hebdomadal cycle is only a particular form of the noctidiurnal. It is the constant succession of the noctidiurnal cycle in periods of seven at a time. It was the law of this cycle from the first that it should consist of seven actual cycles of night and day; and, as the same with the actual, of seven mean also: and it neither was nor could be *de facto* the effect of either of the miracles to alter the law of this succession in any the least respect. No actual week was rendered by either a different thing, according to the law of its own succession, from what every week had been before, or from what every week must still have continued to be, whether either of the miracles had occurred or not. The order of the noctidiurnal cycle in the hebdomadal is called by chronologers the order of *feriæ;* and the meaning of what we have just asserted, more particularly explained, is *this:* that no actual week since the creation has ever consisted of

either more or less than seven actual feriæ. No actual feria in any one hebdomadal cycle since the beginning of things has ever occupied any but its own place in the order both of the noctidiurnal and of the hebdomadal cycle.

The effect of the miracles then on the hebdomadal measure of time is to be explained by that which they produced on the noctidiurnal. One went to the same extent as the other, each on its proper subject: but the hebdomadal was affected only through the noctidiurnal. The period of 24 hours enters the hebdomadal cycle, because the cycle of night and day, of which it is the proper measure, does so too. Seven cycles of the latter kind entering the hebdomadal cycle, seven periods of the former kind enter it also; and it was the original law of the cycle that it should contain only seven of these periods perpetually. By virtue of the first miracle seven integral periods and one half entered one actual week; and by virtue of the second seven integral periods and one half entered another. Thus the original relation of the period of 24 hours to the hebdomadal cycle was broken on each of these occasions. A new succession of such periods in terms of the hebdomadal cycle, and from a new epoch, would become necessary after each; and if we went back to the beginning to find this epoch, after the effect of both miracles was now complete, and to fix it in terms of the old succession, and to bring down this new succession from this new epoch in a manner commensurate with the hebdomadal cycle, and with its proper law *de facto after* the last of the miracles as much as *before* the first; there would be no alternative except to assume the first term of this new succession as the same with the second of the old, yet so as to include the first also: in other words, to consider the first actual week of the new succession as made up of eight such periods as entered the first actual week of the old, instead of seven.

Section XII.—iii. *On the lunar cycle.*

It does not appear either from theory or from observation that there is any necessary connection between the motion of the earth about its own axis, and that of the moon about the earth; or that the former might not be supposed to cease, or to be changed and modified in any conceivable manner,

and yet the latter be supposed to go on unchanged and unaffected, subject to the same law as before.

The addition of twelve hours of mean time therefore to the length of the natural day on two several occasions, even though the effect of a certain suspension or change of the law of the diurnal rotation, would not of necessity imply a corresponding addition on each of the same occasions to the length of the natural month. Yet neither is there any objection *a priori* to the contrary hypothesis; viz. that a real addition on two several occasions to the length of the natural day, or what amounts to the same thing, an actual modification of the law of the diurnal rotation for the time being, might require a corresponding addition to the length of the natural month, and a corresponding modification of the law of the lunar revolution about the earth.

There may be a *positive* connection between the revolution of the moon about the earth and that of the earth about itself, even though there is no *necessary* one; so that the former may be *de facto* at all times dependent upon and subordinate to the latter; and any modification or change of the latter may call for a corresponding modification or change of the former; and even the extraordinary as well as the ordinary phenomena of the diurnal rotation may require to be reflected and repeated in those of the lunar revolution about the earth.

It must be admitted at least that there is much less improbability beforehand in the hypothesis of this kind of affection of the moon in and through the earth, than in that of a similar affection of the earth *a priori* and by itself: and few persons perhaps, who admitted the fact of the latter in a particular instance, would make much difficulty about admitting the former, as a consequence merely of the latter.

We are willing however to concede that this is a question which could not be decided on such grounds as these either way. It must be treated as a question of fact; and it must be determined like other questions of fact by such evidence as is accessible in a case like this. Scripture itself is not altogether silent about the matter of fact in this instance too. The language attributed to Joshua on the first occasion was addressed to the moon as much as to the sun: and

if the sun was capable of standing still in any sense in obedience to that command, so *a fortiori* was the moon; because the moon has a motion of its own, independent of the earth and of the sun, besides that which it has in common with the sun. And as it cannot be denied or disproved that Joshua commanded the moon to stand still, so neither can it be disproved that he intended the moon to stand still; and as much or even more in respect of its proper motion, than of that which it has only in common with the sun. But if the moon actually stood still twelve hours on the first of these occasions, that is, if the length of the current lunation at that time was increased by twelve hours; there will be or ought to be perhaps so much the less difficulty in supposing the same thing to have been repeated on the second occasion: for the very fact of its having been done once before, for ought which *we* know to the contrary, might be reason sufficient why it should be done again on the second.

But as we have already observed, we are willing to consider this question, so far as it applies to the moon, to be altogether a question of fact, which must be decided by testimony; and yet by testimony not that of Scripture. Such testimony may be produced, and it will be found to be decisive. We think it better however for the present to reserve it. It will come with more force and more convincingness hereafter, when many intermediate questions shall have been considered and settled.

SECTION XIII.—iv. *On the natural annual cycle, or the measure of time by the mean natural or tropical year.*

The revolution of the earth about its own axis is so entirely independent of its revolution around the sun, that the former might be suspended for a longer or a shorter time, might be modified and altered in any manner soever, and might even be reversed and turned in the contrary direction, without affecting the latter; and consequently without increasing or diminishing the mean or the actual length of the natural year.

There is no reason then *a priori* to suppose that the addition of twelve hours, on each of two occasions, to the length of the natural day would make any difference to that of the

natural year; or that, whatsoever that was before either of those additions, it did not continue to be just the same after them. We may safely assume therefore that, if the mean length of the natural year just before the first of these miracles was 365 d. 5 h. 48 m. 50 s. 24 th. it was still 365 d. 5 h. 48 m. 50 s. 24 th. after the second also.

It does not appear then that the mean natural year in itself could have experienced any change, by virtue of either of these miracles. It was so little liable *a priori* to be affected by them, such as they were, that we have no occasion to suppose even the interposition of a special act of power or control, on the part of the Author of each, to prevent any such change, and to maintain the natural annual standard and measure of time, as originally laid down and prescribed by himself, in its integrity; though even such a supposition as that, had there been any necessity for it, in our opinion would have been perfectly allowable. Nothing could have produced a change of this kind, but an alteration in the mean rate of the motion of the earth in its annual orbit: and it does not appear that such a further effect as that could possibly have been any natural or necessary consequence of an affection, (howsoever produced,) the proper subject of which was merely the cycle of night and day; that is, the earth itself as revolving about itself.

But with regard to the relation of the natural year to that civil measure of natural annual time, which we have supposed to have accompanied it from the first; it cannot be denied that the addition of twelve hours of mean time on each of two occasions to the length of some one day, by making a difference in the length of that day, would make a corresponding difference in the length of the civil year of which it made a part. And though even this year in appearance on each occasion would consist of no more days than usual, that is, no more *de facto* than 365 actual cycles of night and day; yet some one of these cycles on each occasion would consist of 36 hours of mean time instead of 24: and therefore the year itself on each occasion would consist of 365 nights and days, (measured perpetually by the period of 24 hours of mean time,) and of twelve hours of a 366th.

Now if we may assume that the civil year, which is thus

supposed to have accompanied the natural measure of annual time from the first, was the Julian of the standard and type of our own Fasti; the proportion between the mean natural year of our standard also and this Julian one is such, that the anticipation or recession of the former on the latter amounts to 44m. 38s. 24th. of mean solar time in four years, or in one complete cycle of the Julian leap year; and this is at the rate of 11m. 9s. 36th. every year. The first term of the former then, for the time being, falls back on the first of the latter at this rate of 11m. 9s. 36th. every year, and of 44m. 38s. 24th. every four years; but not at any greater rate. And this rate of precession annually or every four years accumulates to a night and a day, that is, to one entire period of 24 hours of mean time, or to what may be assumed as such a period exactly[c], sometimes in 112 mean natural years, sometimes in 140; according to the peculiar rule of this alternation observed in our Fasti. And as often as it does so accumulate, so often is the relation of the natural cycle of annual time to the civil, and conversely that of the civil to the natural, disturbed and deranged, beyond the limits prescribed both by the reason of things and by the positive rule of our own Fasti; and the latter can no longer be allowed to go on in conjunction with the former as before; the latter can no longer be regarded as the same true and correct representative of the former as until then before. The period of our Julian types themselves is consequently defined and fixed by the disturbance of these relations. It cannot be less than 112 natural years, nor greater than 140. The cycle of change and succession in these types, (as perpetual substitutes, one after another, for the same natural prototype,) and its proper limits, are determined also. It cannot under ordinary circumstances, and according to one and the same rule in general, be either less than one of these intervals of 112 mean natural years, or greater than the other of 140.

If however on each of two occasions an addition of 12 hours was actually made to the length of this Julian year, but no addition at all to that of the corresponding natural year; the consequence of that distinction would necessarily be that, at the end of this civil and of this natural year, the

[c] Cf. the Introduction to the tables, part i.

first term of the latter, instead of being found only 11m. 9s. 36th. behind the first in the former, would be found 12h. 11m. 9s. 36th. behind it*; or what amounts to the same thing, four years after, instead of being found only 44m. 38s. 24th. behind it, it would be found 12h. 44m. 38s. 24th. behind it. The anticipation of the natural on the civil year consequently would be found to have experienced an augmentation of 12 hours of mean time all at once: and an augmentation of that amount would be equal to a difference of half a night and a day, a difference of one half of the period of 24 hours which limits and defines the proportion of the civil type of annual time to the natural perpetually. And this would be equivalent to half the period of one of the Julian types of our Fasti; and half of such a period would be equivalent to 56 natural years, or to 70. The result of all would be the necessity of a change of the perpetual civil type of the natural cycle of annual time, of which we make use, in half the usual length of time.

The proper effect then of each of these miracles, in its proper order of time, on the natural year was to disturb its relation to the civil or Julian prematurely; and to entail the necessity of a fresh adjustment of the latter to the standard of its prototype, (the standard of nature,) so much earlier than otherwise would have been the case. The recession of mean natural annual time on mean civil in one year was precipitated 12 hours of mean time *per saltum;* i. e. over and above its ordinary amount. The gradual effect of 56 years or of 70 years was thus produced in one. The anticipation being thus antedated, the correction is antedated also; and two Julian periods of our Fasti, devoted to two Julian types, (the same as in every other instance besides in all respects but this one of the duration assigned to each respectively,) are seen to consist of 56 years, while every

* We are comparing, it will be perceived, the mean Julian year of 365d. 6h. of mean time perpetually, with the mean natural year of our Fasti. In strictness, the difference made at the time, by the anomaly which we are supposing, in the relations of the *actual* natural year to the *actual* Julian would be this; that the former instead of being 5h. 48m. 50s. 24th. in advance of the latter, at the beginning of the next year, would be the difference of this quantity and of 12 hours behind it; that is, 6h. 11m. 9s. 36th.

other consists either of 112 or of 140. They are those, in which these miracles happened, respectively. The date of the first miracle was the 49th year of the xxth Julian period and Julian type; that of the second was the 19th year of the xxviith. And both these types are seen to be exhausted, in conformity to the rule of our Fasti in general, in 56 years instead of 112.

SECTION XIV.—v. *On the civil annual cycle; or the measure of time by the Julian year.*

It was not the effect of the miracles to disturb the *actual* reckoning of noctidiurnal or of annual time one in terms of the other in the civil year, as it was previously going on, in any sensible manner whatsoever. The actual civil year at the time was the primitive equable year; probably every where, and without exception, at the time of the first miracle, and though not every where in its primitive form still unchanged, at the time of the second, yet every where in some form or shape derived from that; and almost every where retaining an analogy to it which made it externally and in appearance little if any thing different from what it had every where been at first. This equable year neither was nor could have been in the slightest degree affected, in comparison of itself and of what it was before, by either of the miracles; ostensibly and in appearance at least. If it consisted of 365 days and nights before, it did so still. If it was any modification of that number previously, it continued to be the same thing afterwards. The very year of the miracle in each instance would contain neither more nor less than the usual number of actual cycles of night and day, which went to the amount of one and the same equable year perpetually, or to the regular count and reckoning of any other form of the civil annual cycle, which might have been any where previously substituted for it. Some one of these cycles, it is true, would contain 12 hours of mean time more than any of the rest; and the whole annual complex of such cycles in each of these instances, as measured or as measurable by the number of periods of 24 hours of mean time which entered it in succession, would contain half such a period more than any similar complex before or after it.

But this was a difference which would not and could not appear externally on either occasion; nor consequently make any change in the *nominal* reckoning of noctidiurnal and of annual time one in terms of the other as usual, any where.

In like manner if the actual form of the civil reckoning of annual time when these miracles happened had been every where the Julian; or if the Julian type of mean natural annual time, which we have supposed the accompaniment of the latter from the first, had been an actual form of the civil year like the actual Julian at present; it is easy to see that no one essential characteristic of the *actual* reckoning of civil annual time, in the sense of Julian, would have been affected, at least externally and in appearance, by either of the miracles. The cycle of leap year would not have been disturbed by either. No common year would have become a leap year in consequence of either before its time. No year in the civil reckoning of annual time, in the sense and according to the rule and administration of actual Julian, would have consisted of 366 days and nights, reckoned *de facto* and successively, yet distinct from each other, a moment sooner than the law of the Julian cycle of leap year would have required.

In order then to perceive in what manner the joint effect of these miracles would be ultimately found to have affected the noctidiurnal or the hebdomadal reckoning of time in terms of the annual, supposed to be the same as the actual Julian; let us begin with putting the case hypothetically.

Let it be assumed that from May 31 at midnight B.C. 4004, down to May 31 at midnight B. C. 710, the reckoning of noctidiurnal time in civil annual in this sense of Julian went on uniformly; so that one and the same Julian exponent or Julian term might be applicable, and *de facto* was applied, alike to every mean cycle of night and day, and to every actual one, in constant succession. It is manifest that, under such circumstances, from May 31 B. C. 4004 down to May 31 B. C. 710, one and the same series of Julian terms must have served alike for each.

But let it be further supposed that May 31, B. C. 710, an addition of 24 hours of mean time was made all at once to the length of the actual current cycle of night and day; so

that the interval from May 31 at midnight to June 1 at midnight, which according to the usual measure of the noctidiurnal cycle agreeably to the Julian rule should have consisted of 24 hours of mean time only, consisted *de facto* of 48. It is manifest that, in tracing the succession of the mean cycle of night and day, along with that of the actual, first down to this point of time and then beyond it, one and the same set or series of Julian terms, which had served as the exponents of each in common down to this point of time, could no longer serve as the exponents of each beyond it. We should want two sets or series of such Julian terms from this time forwards; one for the mean succession, as brought down to this point from the first, and as continued beyond it without any change whatsoever, another for the actual, as accompanying the mean perpetually without any perceptible difference from it down to this point, but as no longer able to accompany it beyond it. We should want two sets of Julian terms, one for the mean succession, the other for the actual; and the former, in the terms of a common notation of both, one number higher than the latter perpetually. For it must be evident, under such a state of the case as we are supposing, that the mean succession after May 31 B.C. 710, in order to be continued in the same way and in the same notation as before, must be continued in June 2; because by hypothesis June 1 in the mean succession has previously been merged or absorbed in May 31 of the actual: whereas the actual after May 31 must be continued in June 1, if the actual Julian notation of May 31 previously underwent no change because of the addition made to its length. And yet under these circumstances it must be evident also that the actual continued from midnight in the form of June 1, and the mean continued from midnight in the form of June 2, would be the same succession from this time forward, one in comparison of the other, which they had always been down to May 31 at midnight; and would differ in name and in appearance only; that is, in the actual terms of a common notation required and employed by each.

Though therefore a double series of Julian terms, one for the mean succession of noctidiurnal time in annual, and the other for the actual, such as we are describing, beyond this

point of time, in point of fact would be impracticable, and almost impossible; yet that would make no difference to the actual relation of the mean and of the actual notation of noctidiurnal time one to the other, in terms of Julian, before and after B. C. 710, or whensoever else we may suppose the anomaly of which we have been speaking to have taken full and complete effect: viz. That from this time forward the nominal value of a particular Julian term, used for a particular cycle of night and day in each of these successions respectively, in terms of the other must undergo a *change;* a lower term in the actual must become equivalent to the next above it in the mean; an higher term in the mean must drop to the level of the next below it in the actual; yet without any real change in the proper or absolute value of either in any of these cases: the reason being that, down to a certain time in the common succession of both, every term in the one both really and nominally corresponded to the correlative term in the other; but at this particular moment the same nominal actual term in the actual succession became equal to the corresponding nominal term in the mean succession, and to the next to that also, at once.

It follows that one and the same series of Julian terms, as exponents of the constant succession of the noctidiurnal cycle, (both mean and actual,) in the annual in all its parts and all its details perpetually, continued beyond this point of time from the first, might be true in theory, but must be false in fact: and the proper test of its truth or of its falsehood in a particular instance would be the reduction of the same nominal Julian term, as the supposed exponent of a particular noctidiurnal cycle before and after this point of time alike, to something else, to which the succession of noctidiurnal time was constantly referrible as much as to annual, and which might never have varied in itself, notwithstanding the variation thus pointed out of the Julian terms so referred to it perpetually. Now this is the order of the hebdomadal cycle; the order of the noctidiurnal succession in the order of feriæ. The actual order of feriæ has never varied, not even in consequence of the anomaly introduced into the other measures of time by these two miracles. It is therefore the ultimate standard of reference for both these

parallel successions of the mean and of the actual cycle of night and day, each under its proper Julian term and exponent, in the order of noctidiurnal time in annual, in the sense of Julian, perpetually. This test being applied in a given instance, it will always be found to contradict one of these parallel successions, and to confirm the other, if both are continued under the same nominal Julian terms, as the proper exponents of each, beyond the point of time in question. It will confirm that which has undergone the change required by the necessity of the case at this point of time; and it will contradict that which is continued beyond it, without any change, the same as before. In other words, as was naturally to be expected, it will confirm the *actual* Julian succession of the noctidiurnal cycle in terms of the hebdomadal perpetually, both before this point of time and after it. It will confirm the *mean* too, down to this point of time, as still the same with the actual. It will contradict it after this time, as no longer the same with the actual, if it is continued under the same Julian notation of its terms without any change, as that.

SECTION XV.—*On the date of the complete or final effect of both the miracles on the noctidiurnal reckoning of time in terms of annual in the sense of Julian; and consequently of the time when it is properly to be taken into account.*

There cannot be any question, we apprehend, that if the joint effect of the two miracles on natural and on Julian annual time, such as we have been describing, had been produced at once, it must have been taken into account at once. For example, had the anticipation of the natural on the Julian year *extra ordinem*, so occasioned, amounted to one entire period of 24 hours; we could not have delayed the correction of the current Julian type of our Fasti, according to the rule which regulates that correction perpetually, a single year. And this effect on the stated proportion of the mean natural cycle of annual time to the mean civil or Julian coinciding also with a similar anomaly, similarly occasioned, in that of the mean noctidiurnal cycle to the actual, as the same both in themselves and in the Julian terms and exponents which they employ in common; there could have

been no reason why each of these effects should not have been taken into account and allowed for at once, or as soon after as the nature of the case would have permitted; that is, at the end of that one natural and of that one civil year which happened to be current in conjunction at the time.

But this joint effect of both the miracles was actually produced at twice; and that made a material difference. First of all; in consequence of that distinction, the relation of the mean to the actual cycle of night and day was not completely changed in the first instance, but only partially; 12 hours of a second mean cycle, besides the 24 of the one before it which properly belonged to some actual cycle, having been absorbed in that cycle, but not 24. And supposing a new succession of the mean in conjunction with the actual cycle of the same kind to have begun and gone on after this interruption in the same way as before it, only from a fresh epoch[d]; the relation of this *new* succession of the mean to the actual again experienced only a partial and not a total change on the occasion of the second miracle: and a fresh succession of the mean may be supposed to have begun again, even after that, as before, along with the actual; only from a different epoch[d]. The same may be said of the relation of the period of 24 hours to the actual cycle of night and day, which measures the mean cycle of night and day perpetually, but the actual only so far as it is the same with the mean. That relation was broken on each of these occasions, but partially only on either; in the same way in short on each occasion, and to the same extent, as that to the mean.

But secondly; The principal thing to be attended to in all these changes and affections of the original relations of the measures of time to each other being the proportion of the natural cycle of annual time to the Julian or civil; and the noctidiurnal succession being necessarily mixed up with the annual, yet necessarily subordinate to it; it would not have been possible even had it been proper, nor proper even had it been possible, to take into account the particular effect on the noctidiurnal succession until that on the annual also was complete. On each of these occasions, the natural reckoning of annual time was precipitated 12 hours in terms

[d] See supra, p. 304.

of the Julian; but the relation of the former to the latter previously in each instance was such, and the dates of the precipitation in the joint reckoning of both so fell out, that even with this extraordinary anticipation, in addition to that which had been already accumulated, the actual difference, so introduced between them, immediately after each of the miracles did not amount to a night and a day.

Even after the second miracle therefore, when the joint effect of both miracles on the noctidiurnal succession, (that is, the relation of the mean to the actual type of that succession perpetually,) might seem to be complete, it was still necessary to wait the progress of time, to give full and entire effect to the anomaly introduced by both into the relation of the natural annual succession to the Julian or civil also. But at the end of this time, (that is, as soon as the proportion of the natural to the Julian type of the natural, including both the ordinary and the extraordinary disturbance of that proportion, to which this type had been subjected, was now become one of decided inequality,) not only was this inequality between the two types of the annual succession, the natural and the civil, to be taken into account and redressed in the usual manner, though before the usual time; but that of the two types of the noctidiurnal succession, the mean and the actual, and the disparate proportion of the proper Julian terms and exponents, required by each respectively, to the nominal meaning and value of those which both made use of in common, was to be redressed and rectified also.

The date of this point of time is the close of that period of our Fasti, in which the second miracle took place: the date of the egress of the xxviith Julian type and of the ingress of the xxviiith, A. M. 3333, B. C. 672. It follows that this particular year A. M. 3333 B.C. 672 is one of the most important which the history of time brings to light; and second in that respect only to B. C. 4004, A.M. 1, the beginning of time itself in connection with human history, or to these two years, B. C. 1520 and B. C. 710, out of which, and out of the events which happened in them, as we have seen, the very distinction, and therefore the importance, which signalizes and characterises this year itself, ultimately

took its rise. Let us then briefly specify what there is to mark and define it, and to entitle it to this character.

SECTION XVI.—*Of the epoch of this complete and final effect, B.C.* 672; *and what there is to distinguish it.*

i. This year, B.C. 672, the date of the exit of type xxvii from our tables, and of the ingress of type xxviii, is the actual point of time at which, in coming down from the first with the constant individual or numerical succession of mean and of actual cycles of night and day, under their proper Julian terms and exponents, (the same until then for each, and applicable alike both generally and individually to each,) a change takes place in the value of the same Julian term as applied to each respectively; and, as used of a given term in the order of the series of the mean until then, it begins to be inapplicable to the same term in the order of the series of the actual, in the same sense, and *vice versa;* that is, at which a given Julian term in the regular order of the mean series drops one number in the corresponding order of the actual; and a given term in the order of the actual rises one number in the corresponding order of the mean.

ii. It is the point of time at which some two mean cycles of night and day become only equivalent to some one actual cycle; and consequently all and every cycle of either kind having been all along referred to the hebdomadal and all along similarly measured by the hebdomadal, until then, it is the point of time when eight mean cycles of night and day enter the same hebdomadal cycle in the shape of seven actual cycles of night and day; and consequently, (the order of feriæ, or order of the noctidiurnal succession, whether mean or actual, in the hebdomadal, having been constant and always the same with itself,) it is the time when some two mean cycles of night and day occupy only one place in the order of feriæ, in the shape of one actual cycle; each of which would otherwise have occupied a different one.

iii. It is the point of time at which the constant succession of the first noctidiurnal term in the natural succession of annual time, as expressed by its proper Julian term and exponent borrowed from the same succession in the civil, (in other words, the Julian exponent of the mean natural vernal

equinox,) having been brought down without interruption until then from the first term of this description, April 25, to the 27th, March 30, by stated and regular steps of descent, (that is, decreasing by unity perpetually,) drops *per saltum* from the 27th term, March 30, to the 28th, March 28, two numbers instead of one; March 29, the intermediate Julian term between March 30 and March 28, being left out altogether: and yet without any change in the actual value of these Julian terms, as derived from their relation to the same thing, which under all these circumstances still continues the same and invariable, viz. the first noctidiurnal term in the natural year, the first 24 hours dated from the point of the mean natural vernal equinox. For it is manifest that March 28, as the Julian representative of this natural term after this point of time, is just the same in reference to it, as March 30 just before it, or as April 25 itself at first.

iv. It is the point of time at which the epoch of noctidiurnal and of annual time itself (in the sense of Julian or of civil, but of Julian or civil constantly equated to natural,) undergoes a change, nominally at least if not really; and if it was April 25 at midnight, the Feria Prima, down to this point of time, it becomes April 24 at midnight, the Feria Prima, after this time; that is, if we would trace the Julian succession of noctidiurnal time in terms of annual in the sense of natural, from the beginning down to B. C. 672, it must be from April 25 at midnight, the Feria Prima, B. C. 4004: if past B. C. 672, and down to the present time, it must be as from April 24 at midnight, the Feria Prima, B. C. 4004: the mere statement of which distinction however shews it to be only a nominal difference of the epoch in either case; the epoch itself, whether April 25 before B. C. 672 or April 24 after it, being still the Feria Prima at midnight, and the first term of the first natural in conjunction with the first Julian cycle of annual time, the first mean vernal equinox, dated from midnight, B. C. 4004.

v. It is also the point of time at which the absolute sum of actual Julian time, reckoned by periods of 24 hours of mean solar time continually, from a given date before it to a given date after it, requires to be increased by one such period more than appears to be contained in the nominal

sum of such actual Julian time between such limits; to make it agree with the truth. The reason of this is obvious, if there was some one actual Julian date between the limits in question, which nominally and in appearance consisted of no more hours of mean time than any other before or after it, and yet in reality did consist of 24 more; that is, did contain 48 hours of mean time, though no other before or after it ever contained more than 24. It makes no difference whether this given Julian date, before B. C. 672, is nearer to it or further off from it. If we are calculating the sum of mean time, measured by the period of 24 hours perpetually, from any date before B. C. 672 to any date beyond it; the necessity of this addition to the nominal sum of such time, to make it square with the real, is the same in every case *.

vi. Lastly, it is the point of time beyond which astronomical calculations of a certain kind carried back from the present day, the results of which are stated in terms of the Julian reckoning of noctidiurnal and of annual time carried back also, require a correction, as we apprehend, amounting to a day; nominally at least, if not really. But as this is an important subject, on which we are not yet prepared to enter, we shall reserve its further consideration for a future opportunity.

CHAPTER IV.

On the existence of testimony to each or to either of the miracles, extraneous to Scripture.

SECTION I.—*What testimony extraneous to Scripture, and where to be found, and in what shape, it would be reasonable to expect, with respect to two such matters of fact as these?*

If any one considers it necessary to ask for proof of both or of either of the miraculous facts which we have hitherto

* Such would be the case, if the epoch of the entire succession of noctidiurnal time were supposed to be nominally April 25 after B. C. 672 as much as before; but not, if it is assumed to be April 25 before B. C. 672, and April 24 after.

been considering, over and above the testimony of Scripture; he is bound first of all to answer the question, what kind of proof, distinct from and independent of the testimony of Scripture, is it just and reasonable that he should expect us to produce in a case like this?

If he replies, The evidence of contemporaries; the attestation of eyewitnesses of each or of either of these phenomena at the time; we must indeed admit that two such extraordinary phenomena could not happen without being observed; without attracting attention; without exciting surprise and astonishment; without being long remembered; nor even without being noted down and recorded in such notices and records of passing events, as might be kept at the time any where. But still the question must be put at last; Where are these records to be found at present, except in Scripture? The date of the first miracle goes as far back as B. C. 1520; and whatsoever Egyptians, or Chinese, or Hindus, or any other nation ancient or modern, may pretend or may produce to the contrary—B. C. 1520 is much more remote from the present time than the beginning of authentic history any where out of the Bible. It may be asserted with confidence that not a single event of this year (B. C. 1520) either is or can be known at present, except from Holy Writ.

The date of the second miracle was B. C. 710; and though that date does not pass beyond the beginning of profane history in one shape or another, it is much earlier than the commencement of regular and continuous history, external to Scripture, any where. Among the Greeks the historical æra was limited by the Olympiad of Coræbus, B. C. 776; among the Romans by the date of the Foundation, B. C. 753 at the earliest. All history beyond these dates, in the opinion of the most learned, the best informed, and the most judicious of both nations, passed in a great measure for fable. For any thing which has come down about it to the contrary, B. C. 710 is just as great a blank in all parts of the world as B. C. 1520. We might venture to say that Dejoces was reigning at this time in Media, Gyges in Lydia, Gjemschid in Persia, Numa Pompilius at Rome, and so forth; but that would be all. A segment of profane history, just before

the second miracle, has come down from the Greeks, somewhat circumstantially related; viz. that of the first Messenian war: and a similar segment just after it, that of the second Messenian war. But B. C. 710 itself falls critically between the two. The first Messenian war ended in B. C. 724, and the second began in B. C. 685.

It may perhaps be replied that tradition is competent to supply the place of history; and that in a case of this kind traditional testimony to the fact was more to be expected beforehand than historical. Yet the same question will still recur: what kind of tradition would there be reason to expect? and whether an uniform tradition everywhere, (a tradition consistent with the simple truth, that is, with the matter of fact in each instance just as it is related in Scripture,) or not?

Now with respect to an uniform tradition in a case like this, in all quarters of the globe and among every nation of antiquity; a tradition agreeing in the circumstantials and details of two such matters of fact as these everywhere; it would not be possible. The difference of meridians would render it impossible. An addition of twelve hours to the length of the natural day, for one meridian, would be an addition of twelve hours to the length of the natural night, for the opposite meridian: and if tradition had handed down the effect for each of two such meridians as it must actually have held good; it must have handed it down in one instance in a manner at first sight directly at variance with the matter of fact in the other. Under such circumstances, the truest and most authentic tradition of this kind in one quarter of the world might have seemed to differ only so much the more from the truest and most authentic in another.

And as to the supposition of a tradition in a case like this, consistent with truth, and neither more nor less than the simple matter of fact as related in Scripture; such a tradition in all parts of the globe and among all nations would be morally if not physically impossible. It is proved by experience, (in every case of the kind in which an appeal can be made to that test,) that no matter of fact committed to the custody of an oral tradition, and handed down perpetually in such a channel, can be constantly kept free from perver-

sion and misrepresentation. The tendency of tradition is invariably found to be to alter and modify, and commonly to distort and exaggerate, the truth: and the more so the longer it continues, and the more extraordinary the matters of fact themselves are, which are thus transmitted from mouth to mouth: so that, though it may begin with history, it ends at last in fable.

And this leads us to observe that the annals of antiquity almost every where do actually exhibit traditions, the foundation of which, it is easy and obvious to perceive, must have been one or other of these two miraculous facts of Holy Writ, merely perverted, merely misrepresented—merely distorted or exaggerated by virtue of the natural and necessary tendency of tradition so to deal with every thing, especially of an extraordinary description, committed perpetually to its charge. The question in all these cases which we have to determine is this: whether there is not a real foundation, in some matter of fact, even for such representations as these? and whether that foundation is not to be discovered in one or both of these miracles of Scripture? The most extravagant fable of antiquity presupposes something, currently reported and commonly believed, into the influence of which its own origin and its own reception are to be resolved. It would be as unphilosophical to reject every thing of this kind without examination, as to receive every thing without hesitation and discrimination: and just as wise as if the chemist were to cast away the mass of ore submitted to his analysis, before he had ascertained whether it did not possibly conceal a few grains of gold, which it was worth his while to sift and separate from the spurious mixture of foreign and valueless matter in which it lay embedded.

The Chinese had a tradition of a sun which did not set for ten days[z]. The Persians had a tradition of a Mithras, (which means a sun,) thrice as long as usual*. The Greeks

* This Persian tradition rests on the authority of Dionysius Areopagita, and of his epistle to Polycarp on the subject of the miraculous darkness at the crucifixion: *Μάλιστα μὲν οὖν ταῦτα ταῖς Περσῶν ἱερατικαῖς ἐμφέρεται φήμαις, καὶ εἰσέτι μάγοι τὰ μνημόσυνα τοῦ τριπλασίου Μίθρου*

[z] Martinius, Historia Sinica, I. Imp. vii. p. 37. Amstelædami, 1659.

had a tradition of a night-day, (devoted to the conception of their Hercules,) thrice the ordinary length *. Nor were such

τελοῦσιν[a]. Maximus' commentary on this passage is[b]: Μίθραν τὸν ἥλιον Πέρσαι καλοῦσιν. τὸ παρέκταμα οὖν τῆς ἡμέρας ἐκείνης διὰ τοῦ τριπλασίου (ἡλίου) ἐσήμανε. That of Pachymeres[c]: Οἱ Πέρσαι . . . τὸ παρέκταμα (δὲ) τῆς ἡμέρας ἐκείνης διὰ τῆς τελετῆς τῶν μνημοσύνων τοῦ τριπλασίου σημαίνουσιν.

In all these cases the allusion is to the first miracle, that of the time of Joshua, and to the addition to the length of the day made on that occasion: and in referring these ceremonies of the mysteries of Mithras, whatsoever they were, to this first miracle, it is possible these authorities may be all mistaken. And yet some record of one or other of the miracles of Scripture might enter into those mysteries; especially of the second one, which preceded the correction of the Persian calendar by Gjemschid only eight years. The religious system incorporated in this calendar, we are of opinion, was the work of an older legislator, the reformer of the Bactrian calendar, the first of the two Zoroasters of antiquity; whose time was considerably later than the date of the first miracle, yet considerably prior to that of the second.

* Hence the appellation of τριέσπερος applied to Hercules. Lycophron styles him τριέσπερος λέων: Ταύτῃ καὶ τριέσπερος λέγεται κατὰ Λυκόφρονα· φησὶ γὰρ κ', τ. λ.[e]—Ἦ ὡς ἀκούομεν τὴν Ἡρακλέους τριέσπερον[f].

It appears from the Scholiast on Homer that the first author of this tradition among the Greeks was Pherecydes of Syros: Φασὶ Δία συγκοιμώμενον Ἀλκμήνῃ πεῖσαι τὸν ἥλιον μὴ ἀνατεῖλαι ἐπὶ τρεῖς ἡμέρας. ὅθεν ἐπὶ τρεῖς νύκτας συγκοιμηθεὶς αὐτῇ ὁ Ζεὺς τὸν τριέσπερον Ἡρακλέα ἐποίησεν. ἡ ἱστορία παρὰ Φερεκύδει[g].

Pherecydes of Syros was the preceptor of Pythagoras. He must have flourished near the end of the seventh century before Christ: and therefore could scarcely have lived 100 years later than the second miracle. He might have heard not only of that, but of the much older phenomenon in the time of Joshua: and out of both he could have little difficulty in making up one night-day equal in length to two or three, and devoted to the conception of Hercules.

There are certain suppositions even in the Iliad and the Odyssey, on which Homer perhaps would not have ventured, had he not heard of such a thing before his own time as a day made longer than usual. He could not indeed have known any thing of the second miracle, two hundred years later than his own time; but he might have heard of the first.

Cf. ad Iliad Σ. 239 : 241 : and in particular ad Odyss. Ψ. 241—246 : 344—349.

a Opp. ii. Ep. vii. § 2.
b p. 96.
c p. 103. Cf. Hyde, De Religione Vett. Persarum, iv. 115.
e Lydus, De Mensibus, iv.46.81. l.18.
f Alciphron, Epp. iii. xxxviii.
g Ad Iliad. Ξ. 323. Ἀλκμήνης. Cf. ad Odyss. Λ. 266.

traditional recollections of the two great miracles of Scripture confined to the old world. The same vestiges of them, in the same kind of traditionary representations, are discoverable in the new world *.

We are willing however to admit that, whatsoever founda-

* "Les peuples de la Floride prétendaient que jadis le soleil ayant prolongé de vingtquatre heures son séjour dans l'océan; les eaux du grand lac Théomi se débordèrent avec une telle abondance que les sommets des plus hautes montagnes de la terre en furent couverts, à l'exception de la cime du Mont Olaïmi, que le soleil garantit de l'inondation à cause d'un temple qu'il s'y était bâti de ses propres mains[h]."

It is easy to see that the deluge of Noah and the solstice of Joshua are blended together in this tradition: and that the former is made an effect of the latter. The period however assigned to the supposed prolongation of the night, 24 hours, is remarkable; that being the amount of the addition to the length of the natural day made on both occasions together. The meridian of this tradition might be twelve hours west of that of Jerusalem: and the addition in this case might strictly be one of 12 hours to the ordinary length of the night, which might easily come to be represented as the sun's delaying to rise 24 hours longer than usual.

On this subject, we extract the following passage from Ellis' Polynesian Researches[i]:—

"One of the most singular of their traditions respecting the sun deserves attention from the slight analogy it bears to a fact recorded in Jewish history.

"It is related that Maui, one of their ancient chiefs or priests, was building a marae or temple, which it was necessary to finish before the close of the day: but perceiving the sun was declining, and that it was likely to sink before the work was finished, he seized the sun by his rays, bound them with a cord to the marae or an adjacent tree, and then prosecuted his work until the marae was completed; the sun remaining stationary during the whole period."

The author adds, "I refrain from all comment on this singular tradition; which was almost universally received in the islands."

It is worth the while of an astronomer to inquire into the meridians of these islands, in comparison of that of Jerusalem; and whether an hour after sunrise at Jerusalem, May 31, B. C. 1520, or 6 A. M. of mean time, might not be an hour before sunset for some of them. Pointe Vénus in Taïti (according to the Connaissance des Temps) is 10h. 7m. 17sec. west of Paris, and therefore 12h. 18m. 42sec. west of Jerusalem. It would be an interesting discovery, from the fact of such a tradition and in such a quarter, to find that these islands were already peopled and by the same race so early as B. C. 1520.

[h] Daunou, tome v. leç. ii. p. 74.

[i] Vol. ii. ch. xiv. p. 414.

tion there may have been for all such traditions as these; they must still be considered too ambiguous and doubtful to be seriously appealed to on a question of fact so important as that which we are endeavouring to decide on its proper grounds of proof. And yet other traditions there are, (not yet alluded to,) of a more intelligible, a more authentic, and on every account a much more unexceptionable kind; which ultimately rest on the same foundation as these: and that foundation, the two miracles of Scripture. Certain matters of fact, which do not admit of being disputed, are still upon record; the examination of which leads to the discovery of the particular testimony to one or other of these miracles over and above that of Scripture, of which we are in search; and which it is desirable to inquire into, if not for our own satisfaction, (for we ourselves neither desiderate any testimony to either of these facts, after that of Scripture already produced, nor consider any to have been necessary beforehand but that of Scripture,) yet possibly for that of others.

SECTION II.—*Particular testimonies.* i. *Tradition of the priests of Egypt, reported by Herodotus.*

Herodotus appears to have visited Egypt about B. C. 456: and when he was there, he was told by the Egyptian priests that between the time of Menes the first king of Egypt, and that of Sethos the priest of Vulcan, (the Egyptian Phthas,) the sun had four times deviated from the order of nature in its rising and (as the context implies) in its setting also: Ἐν τοίνυν τούτῳ τῷ χρόνῳ τετράκις ἔλεγον ἐξ ἠθέων τὸν ἥλιον ἀνατεῖλαι· ἔνθα τε νῦν καταδύεται ἐνθεῦτεν δὶς ἐπαντεῖλαι· καὶ ἔνθα νῦν ἀνατέλλει ἐνθαῦτα δὶς καταδῦναι[k].

[k] ii. 142. It is proper to observe here, that an accurate Egyptian tradition on the subject of these miracles was of all others the best calculated to agree *prima facie* with the account of them in Scripture. The principal school of astronomy in Egypt in B. C. 1520, and very probably also in B. C. 710, in our opinion, was On or Heliopolis: the meridian of which differed very little from that of the ancient Memphis or of the modern Cairo. The latitude of Jerusalem being assumed at 31° 47′ 47″ N., that of Memphis may be assumed at 30° 2′ 4″, (that of the modern Cairo,) and that of Heliopolis at the same. The difference of meridians between the latter and Jerusalem was only 15 min. 44 sec. west; and 6 P. M. mean time at Jerusalem, May 31, B. C. 710, would be 5 h. 44 m. 16 sec. P. M. at Memphis or Heliopolis. The sun would set the same day, for either of the latter, about 6 h. 56 m. apparent time, 6 h. 46 m. mean: and the miracle for either of those meridians would happen about one hour before sunset—very little different from what it did at Jerusalem.

There are few passages in Herodotus which have attracted more notice or been more frequently quoted than this; yet no chronologer of modern times has done justice either to the tradition recorded in these words, or to Herodotus who has related it; much less to the testimony which it was calculated to bear to the truth of the two miracles of Scripture*. Among these chronologers there have been some whom nature had endued with the most acute and sagacious intellects; men whose learning and information were almost encyclopædic; men whom practice had rendered familiar with such questions; and whose perceptions of the truth which lay concealed under the surface of an outward representation, not more obscure or recondite than this, in other cases of like kind appear to have been almost intuitive. Yet all and without exception have equally overlooked the important, and to our apprehensions obvious, truth contained in this tradition. Such is the force of prejudice; of long and inveterate prejudice: and what prejudice is of longer standing and more inveterate than that which, for some reason or other, has always stood in the way of the simple unhesitating admission of each of these miraculous matters of fact, according to the literal account of each of them given in Scripture?

By some this Egyptian tradition has been summarily dismissed as a fable; and as one of the most extravagant fables of antiquity. Others have conjectured that Herodotus misunderstood the priests of Egypt, who meant to convey to him some very simple and possible truth under all this mystery, and all this seeming impossibility. No one appears to have thought of inquiring whether, after all, this representation might not be only a summary account of two matters of fact, which as a Christian chronologer he could not but know were actually to be read of in Scripture; and with no more of misstatement than under the circumstances of the case might have been expected *a priori*, and in fact, at that dis-

* We must except from this censure indeed one modern chronologer, and illustrator of Scripture, Calmet; who appears to have recognised the two miracles in this Egyptian tradition, and to have explained the latter by a reference to them. See Mémoires de l'Académie des Inscriptions, xxix. p. 100.

tance of time after the events themselves, was almost inevitable*.

* In illustration, and at the same time in justification, of what we have thus observed, we will quote Mr. Ideler's remarks on this passage of Herodotus, translated from his Technical Chronology, Egyptian Calendar:

"This obscure passage has been literally understood; and an astronomical truth sought for it, which it by no means contains. In my opinion, it merely states in a mystical manner, misunderstood by Herodotus, the fact that in this long period (from Menes to Sethos, 341 generations) the Canicular cycle had revolved eight times. Eight times 1461 give 11,688 years: a few centuries more than the specified number of generations, 341, (at the rate of three generations to 100 years = 11,340 years,) an excess of no importance whatsoever in such a rough measure of time. Probably the priests meant in their mysterious language to say that, during this period of time, the summer and winter solstices had fallen eight times on the usual days in the Egyptian year, i. e. those days on which they now fall: that, on the other hand, the summer solstice had fallen eight times on the day on which the winter solstice now falls, and the winter solstice eight times on the day of the present summer solstice. The summer solstice they expressed by the setting, or more properly the going down, of the sun from the zenith; the winter solstice by the rising, or going up to the zenith. It was very natural for Herodotus, who could not enter into the dark meaning of their expressions, to mistake this for a literal rising and setting; and when he noted down these words on later recollection, to distribute the number eight in the manner he has done. I hope, at least, this explanation will be found more satisfactory than any of those which are collected in the 29th volume of the Transactions of the Academy of Inscriptions, (p. 76 sqq.) Scaliger is the only person who has thought of a Canicular period in connection with this passage. After mentioning the 11,340 years, (341 generations,) and the obscure passage of Herodotus, he proceeds to say[k]: 'Quod quamvis prima fronte fabulosum videtur, habet tamen implicitam speciem veri. nam in una magna periodo sol mutat sedem semel in mensibus Ægyptiacis, ut qui principio in Thoth solstitium ingrederetur, post 730 annos in brumam incideret in aliqua parte ejus mensis.' But he rejects this notion when he adds, 'Sed hoc non fuerit occasum et orientem mutari. missa igitur illa mendacia et somnia Ægyptiorum faciamus.' And thus authorized by him Wesseling remarks this passage as an instance of 'nugæ et fabellæ Ægyptiacæ.'"

Thus far Mr. Ideler; of whose explanation of the passage we leave our readers to judge as they think proper.

We observe however that it must be a singular coincidence, which has made so many of the best scholars of modern times fall into the same mistake, in their construction of the passage; as if it spoke of *eight* changes of the sun's place, and not merely of *four*. The reason of this mistake must have been, that they did not perceive that the latter part of Hero-

[k] De Emendatione, ii. 197. D. 198. A.

The testimony of Scripture—the sole and sufficient authority of Scripture—(to whatsoever its testimony is given, and

dotus' statement was explanatory of the preceding; one part declaring the changes in question, such as they were, in general, the other furnishing the particulars of them. He should indeed have begun with telling us that the sun had *four times set* as well as four times risen ἐξ ἠθέων: but this omission does not prevent his real meaning from being sufficiently intelligible—viz. That the sun had *twice set* where it was accustomed to rise, and *twice risen* where it was wont to set: *four times* consequently, not *eight* times, contrary to the established order and course of things, in all.

The phrase used here, ἐκ τῶν ἠθέων, is equivalent to ἔξω τῶν ἠθέων, or as Thomas Magister explains it, to ἔξω τῆς συνηθείας: Ἡ ἐξ ἔστιν ὅτε καὶ ἀντὶ τοῦ ἔξω τίθεται, ὡς τὸ ἐξ ἀνθρώπων ἐγένετο· καὶ Ἡρόδοτος ἐν τῇ δευτέρᾳ· τετράκις ἔλεγον ἐξ ἠθέων τὸν ἥλιον ἀνατεῖλαι· ἤγουν ἔξω τῆς συνηθείας[l]. The parallel phrase of ἐκ τῶν ἀνθρώπων ἐγένετο, which he alludes to, occurs in Memnon of Heraclea; (speaking of the tyrant Dionysius, surnamed ὁ χρηστός:) Οὐδὲν δὲ ἧττον καὶ μετὰ τὴν ἐκείνου ἐξ ἀνθρώπων ἀναχώρησιν[m]: in Diodorus Siculus: Μετὰ τὴν τοῦ πατρὸς Ὀσίριδος ἐξ ἀνθρώπων μετάστασιν[n]: and in the Scholiast on Pindar[o]: Ἐξ ἀνθρώπων γενομένων Θησέως καὶ Ἡρακλέους. Ἔξω on the contrary, and not ἐξ occurs in Porphyry Ὡς ἔξω τῆς ὀργῆς καταστάς.

Ἐκ so used instead of ἔξω is frequently found in Homer:

Ἕκτορα δ' ἐκ βελέων—ἀντὶ τοῦ ἔξω βελῶν[q].

It is most frequent however in composition.

Τίς ὄρνις οὗτος ἔξεδρον χώραν ἔχων[r]; i. e. παρηλλαγμένην.

Ἔξωρα πράσσω κοὐκ ἐμοὶ προσεικότα[s].

Schol. ἔξω τῆς ὥρας.

Γήτης ὅπως ἄρουραν ἔκτοπον λαβών[t].

Εἶδε γὰρ ἐκνόμιον
λῆμά τε καὶ δύναμιν
υἱοῦ[u].

Ἔκδικος· ... ἔξω τοῦ δικαίου[x].—Ἐκπάτιον· τὸ ἔξω πάτου[y].—Ἔκφρων· ἐκτὸς φρενῶν[z].—Ἐξαγώνιος· ὁ ἔξω τοῦ ἀγῶνος[a].—Ἐξεικάδιοι· οἱ ἐκτὸς τῆς εἰκάδος καὶ τάγματος τοῦ αὐτοῦ[b].—Ἔξηβος· ἔξω τῆς ἥβης, τριάκοντα

[l] Pag. 318. 5.

[m] Apud Photium, Bibliotheca, Cod. 224. p. 224. l. 24.

[n] i. 25.

[o] Ad Pythia, v. 92.

[p] De Abstinentia, ii. 29. 155. (De Rhoer, 1767.)

[q] Etym. Mag. ἐξ ἁλός ... ἔξω ἁλός. Cf. Iliad. Α. 163, 164: and the Scholia in loc. Also Odyssey, Α. 134, and the Scholia.

[r] Aristophanes, Aves, 276. From the Tero of Sophocles, (cf. Fragm. Soph. 578. Dindorfii,) also ad 424. Euripides, Hippolytus, 935: ἔξεδροι. Schol.: οἱ ἐξεδροποιοὶ τῶν φρενῶν. Anecd. Græca, 40: ἔξεδρον· ἔξω τῆς νενομισμένης ἕδρας. Sophocles, Philoctetes, 212: ὡς οὐκ ἔξεδρος: "not far from home."

[s] Soph. Electra, 618.

[t] Trachiniæ, 32.

[u] Pindar, Nemea, i. 36. Cf. Etym. Magn. ἐκνομίως ... οἷον ἔξω νόμου.

[x] Etym. Magn. ἔκδικος.

[y] Hesychius, i. 1146. Cf. Æschylus Agamemnon, 50.

οἵ τ' ἐκπατίοις ἄλγεσι παίδων.

[z] Ib. 1158.

[a] Ib. 1269.

[b] Ib. 1279.

to whatsoever it stands committed,) has no need of confirmation from Egyptian tradition, or from any other tradition whatsoever; and we will venture to add, paradoxical as the assertion may appear, it can receive none. No human testimony, nor in any shape, can add an iota to the single sufficiency of the testimony of Scripture—to whatsoever it is distinctly given. And yet this Egyptian tradition may derive both light and confirmation from Scripture: and to judge from that cloud of mystery, in which to the apprehensions of modern critics and chronologers it has been so long involved, it stands greatly in need of illustration from some such quarter as Scripture, to teach them at once what must always have been intended by it; and consequently to make its true meaning no longer a difficult or a doubtful problem.

πέντε ἐτῶν[c].—'Εξήνιοι· παρὰ τὸ ἔξω ἡνίων γενέσθαι[d].—'Εξήνιον· ἔξω τοῦ ζυγοῦ[d].

It is particularly usual in *ἐξίστασθαι*, with the ellipsis of *φρενῶν* or *ἑαυτοῦ*: and in the opposite sense we meet with *ἔνδον* (*γίνεσθαι*.)

"Ενδον γενοῦ· χαρᾷ δὲ μὴ 'κπλαγῇς φρενῶν[e].

We have a similar idiom: "out of his mind:" "out of temper:" "out of spirits:" "out of square;" and the like.

In the sequel of the same passage Herodotus tells us further that, according to the account of the priests, these extraordinary phenomena in the heavens produced no corresponding changes on the earth: *Καὶ οὐδὲν τῶν κατ' Αἴγυπτον ὑπὸ ταῦτα ἑτεροιωθῆναι, οὔτε τὰ ἐκ τῆς γῆς οὔτε τὰ ἐκ τοῦ ποταμοῦ σφι γινόμενα, οὔτε τὰ ἀμφὶ νούσους, οὔτε τὰ κατὰ τοὺς θανάτους.* *'Υπὸ ταῦτα* here has been mistaken as if it was *ὑπὸ τούτων*—"By means," or "by reason," "of these things:" though, as used with the accusative, *ὑπὸ* has here the sense of the Latin sub, with the accusative or with the ablative also; "About the time of these things." From the allusion to the river, *τὰ ἐκ τοῦ ποταμοῦ σφι γινόμενα*, we might have conjectured at first sight that the extraordinary phenomena in question were remembered to have happened about the time when the Nile was rising: and the true date of the miracles May 31—would be only about a month before that time. But Herodotus speaks of the river in the same manner on another occasion: [f] *'Επ' 'Αμάσιος δὲ βασιλῆος λέγεται Αἴγυπτος μάλιστα δὴ τότε εὐδαιμονῆσαι καὶ τὰ ἀπὸ τοῦ ποταμοῦ τῇ χώρῃ γινόμενα καὶ τὰ ἀπὸ τῆς χώρης τοῖσι ἀνθρώποισι.* *Τὰ ἀπὸ τοῦ ποταμοῦ γινόμενα* then, in the former instance, probably means the same thing as here, where it can be intended of nothing but *τὰ γίνεσθαι εἰωθότα.*

[c] Ib. i. 1290. Cf. Anecdota Græca, i. 37. l. 17. *"Εξηβον· τοῦτο καινόν· καθωμιλημένον τὸ ἔξωρον.* [d] Ib. 1293.

[e] Æschylus, Choëphori, 233. In the following passage of Herodotus *ἐκ* might have been used; though *ἐκτὸς* actually is so: iii. 80: *Καὶ γὰρ τὸν ἄριστον ἀνδρῶν πάντων στάντα ἐς ταύτην τὴν ἀρχὴν ἐκτὸς τῶν ἐωθότων νοημάτων στήσειε.*

[f] ii. 177.

Now if the tradition had run in *these* terms; That between such and such limits in point of time the sun had *twice* been seen to be *rising* WHEN it should have been seen to be *setting*, and *twice* had been observed to be *setting* WHEN it should have been seen to be rising; a more concise and yet a more correct representation of the actual matter of fact, as it must have been witnessed on each occasion at Heliopolis in Egypt, could scarcely be imagined. Is it then any objection that, according to the actual tenor of the tradition as reported by Herodotus, the sun was said to have been twice seen rising or setting WHERE not WHEN it should have been seen doing the contrary? We think not: especially when it is considered that on the second occasion, (the circumstances of which were more likely to be remembered than those of the former,) the sun was actually perceived to have risen *from* the west: and even on the former occasion, it was to be seen still rising in the east when it should have been seen already setting in the west: and that, at the distance of a thousand years afterwards, might easily come to be represented as the sun's rising where it had been accustomed to set; and *vice versa*.

The strongest internal evidence of the authenticity of this Egyptian tradition and of its actual reference to the two miracles, next to its perceptible agreement with the historical account of both in Scripture itself, in our opinion is the chronological limits which it assigns to all these cases of departure from the laws of nature in this one article of the rising and of the setting of the sun; viz. the reign of Menes and the reign of Sethos. Menes was the first of the human kings of Egypt in contradistinction to such as were supposed to have been divine: and whether a real or a fictitious personage was meant by that name, his time went much further back than the solstice of Joshua. Sethos, on the other hand, was a contemporary of Hezekiah's; of which we have *this* proof: That Egypt, according to Herodotus, was invaded by Sennacherib in the reign of Sethos[g], just as we know from Scripture that Judæa was in that of Hezekiah; and that Egypt, according to Herodotus, was delivered in a miraculous manner from this invasion in the time of Sethos, just as Judæa was in that of Hezekiah.

[g] ii. 141. See Berosus also, apud Jos. Ant. Jud. x. i. 4.

Now this miraculous deliverance of Judæa is to be dated at the very end of B. C. 711, or the very beginning of B. C. 710. If Sethos then was living, and reigning in Egypt, within less than 12 months before the date of the second miracle; it may reasonably be supposed he was still living and reigning in that country, at the date of the miracle itself. Yet it may be collected from Herodotus and from Scripture also that he could not have begun to reign in Egypt much before B. C. 711. The immediate predecessor of this Sethos in Egypt, according to Herodotus, was Sabacos the Æthiopian[h]; whom Scripture denominates So[i], and whom it shews to have been still reigning in Egypt at the time of the beginning of the siege, if not at that of the capture, of Samaria by Shalmanezer, king of Assyria; that is, between the 4th and 6th year of Hezekiah, B. C. 721 and 719. Sethos then must have come to the throne in Egypt between the 4th and the 15th of Hezekiah, the year in which the miracle took place; i. e. between B. C. 721 and B. C. 710.

As the first miracle then could not possibly have passed beyond one of tbe limits prescribed to both, the reign of Menes; so neither could the second have passed beyond the other, the reign of Sethos. And yet this last must have approximated so nearly to the beginning of his reign, as to have been in great danger of falling beyond it, had it not been fixed within the limits of his reign by the event itself: which we may justly regard as a critical coincidence, and as a strong internal evidence of the truth of this Egyptian account.

A similar tradition appears in Pomponius Mela: and yet with so much difference from Herodotus' representation of it, that we should not be justified in saying Pomponius' was only a repetition of that of Herodotus[k]. It is asserted by Solinus too[l], that the inhabitants of the διακεκαυμένη of anti-

[h] ii. 137–139. [i] 2 Kings xvii. 4.

[k] i. 9. Mela's own words are these: Ipsi (Ægyptii sc.) vetustissimi ut prædicant hominum: trecentos et triginta reges ante Amasin, et supra tredecim millium annorum ætates certis annalibus referunt: mandatumque litteris servant dum Ægyptii sunt quater cursus suos vertisse sidera[l], ac solem bis jam occidisse unde nunc oritur. Herodotus has 341 generations not 330 kings: and 11,340 years not 13,000. There is nothing in his statement about the changes of the course of the stars; nor any thing in Mela's expressly about the sun's rising as well as setting in a manner different from usual.

[l] Polyhistor, xxxii. § 39.

quity, as he styles it, bordering on Egypt, the Troglodytes of classical geography, preserved a tradition among them which also recognised one or both of the miracles of Scripture, (most probably indeed the second, when the sun was actually seen to have risen *out of* the west; and the west so far to have been turned into the east;) Ægyptium limitem, qua ad Diacecaumenen tendit, incolunt populi: ... iidem populi ferunt a primis sibi gentis suæ avis traditum, ubi nunc occasus est, quondam ibi solis ortus fuisse. And this must be considered altogether a distinct tradition, and independent of that of Herodotus.

Nor is this the only remarkable Scripture fact of which the inhabitants of those parts still preserved the recollection at a very late period of time. Diodorus Siculus reports[m] that the Ichthyophagi, (natives of the same regions in general though more in the vicinity of the Red sea,) retained even in his own time the memory of a sudden parting asunder of the Sinus Arabicus, which laid the bottom dry to a great extent. And this fact no simple minded and unprejudiced reader of Scripture could hesitate to refer to the miraculous division of the Red sea at the time of the Exodus.

SECTION III. ii.—*The Greek fable of the banquet of Thyestes and of the recession of the sun.*

The Grecian story of the unnatural quarrel of Atreus and Thyestes, and of the horrible consequences to which it led, which the tragic drama has rendered familiar to classical readers of the remains of antiquity, must be pronounced a mere invention of later times; not only because it was unknown to Homer, but what is more, because it is directly contradicted by his better testimony*.

* It is clear, from Homer's account of the *σκήπτρου παράδοσις*, that he was a total stranger to this domestic feud. He supposes Atreus to have lived in perfect harmony with Thyestes; and at his death (for Homer represents Atreus as having died before Thyestes) to have left him regent of the kingdom, (to be held in trust by him for his son Agamemnon,) as well as guardian of his children: and Thyestes as so faithful to his trust, that instead of transmitting the kingdom to his own issue, one of whom was

m iii. 40.

In this fable however there are two principal circumstances: i. The supposed banquet of Thyestes on his own children; ii. The supposed going back of the sun in the heavens in consequence of that banquet. The former is pure and unmixed fiction, without a particle of historical truth on which to rest; the latter is fabulous also as an adjunct or concomitant of the former, yet not necessarily so in itself: unless it could be proved, on other and independent grounds, that no such thing as a recession of the sun ever did or ever could have happened under any circumstances, because nothing of the kind ever did happen in connection with this banquet of Thyestes, or with this family feud of the children of Pelops.

If we inquire into the history of these two circumstances either singly or in conjunction, no traces of either are to be

Ægisthus, (not much younger than Agamemnon,) he appointed Agamemnon his successor, (agreeably to his brother's will,) and inheritor of the sceptre of Pelops next after himself[n].

Ἡ διπλῆ, observes the Scholiast[o], *ὅτι οὐ γινώσκει τὴν ἔχθραν Ἀτρέως καὶ Θυέστου, ἀλλὰ συμφωνοῦντας αὐτοὺς συνίστησι.* The most sensible of the Greeks could not fail to draw this conclusion from the testimony of Homer; condemnatory of the popular fable of the drama: Ἀλλ' *ἄχθεσθαι σφόδρα ἐάν τις ἐξελέγχῃ τοὺς μύθους τῶν τραγῳδιῶν, λέγων ὅτι οὔτε Θυέστης ἐμοίχευσε τὴν τοῦ Ἀτρέως, οὔτε ἐκεῖνος ἀπέκτεινε τοὺς τοῦ ἀδελφοῦ παῖδας, οὔτε κατακόψας εἱστίασε τὸν Θυέστην*[p].

There is another equally famous tragic story, which was just as little known to Homer; that of the sacrifice of Iphigenia. Long after this sacrifice, Iphigenia (whom he calls Iphianassa) was still alive, and a blooming virgin at her own home, when Agamemnon offered her in marriage to Achilles[q]. On what slight grounds the *νεώτεροι*, (as the Scholiast calls them,) inferred the fact of this sacrifice in particular, from Homer's testimony, may be seen from the remarks of the Scholiast on the words of Agamemnon to Calchas:

Μάντι κακῶν[r], *κ', τ. λ.*

This sacrifice appears to have been equally unknown to Hesiod, (300 years younger than Homer,) though he mentions the detention of the Greeks at Aulis.

Εἰ μὴ ἐς Εὔβοιαν ἐξ Αὐλίδος ᾗ ποτ' Ἀχαιοὶ
μείναντες χειμῶνα πολὺν σὺν λαὸν ἄγειραν
Ἑλλάδος ἐξ ἱερῆς Τροίην ἐς καλλιγύναικα.

Opp. et Dies, 659.

[n] Cf. ad Iliad B. 102 seqq. [o] On v. 107. [p] Dio Chrysost. xi. tom. i. 309. 15. [q] Iliad I. 144. [r] Ib. 108.

met with, (as far as we ourselves are aware,) before the time of Œnopides of Chios: of whom Achilles Tatius (the commentator on Aratus) records a singular opinion; viz. That the sun once moved in the galaxy or milky way; but that in consequence of this unnatural feast of Thyestes it turned from its former path in aversion, and thenceforward moved in the ecliptic. Ἕτεροι δέ φασιν, ὧν ἐστι καὶ Οἰνωπίδης ὁ Χῖος, ὅτι πρότερον κατὰ τοῦτον ἐφέρετο ὁ ἥλιος· διὰ δὲ τὰ Θυέστεια δεῖπνα ἀπεστράφη καὶ τὴν ἐναντίαν τούτῳ πεποίηται περιφορὰν, ἣν νῦν περιγράφει ὁ ζωδιάκος[s]. The age of Œnopides is critically determined, (as we hope to shew more at large on a future occasion,) by the date of his lunæsolar cycle of 59 years, B. C. 544: and it appears from Diodorus[t], and others, that he was sometime or other in Egypt.

The existence and belief of the fable relating to the banquet is thus traced up to the time of Œnopides; and we may presume was even older than that: but there is nothing in this opinion, as related by Achilles Tatius, to connect it with a recession of the sun. A change of the orbit of the sun from the galaxy to the ecliptic is a totally different thing from the going back of the sun in the ecliptic itself; and it does not appear that the opinion of Œnopides upon this point went further than the supposition of such a change. Achilles Tatius indeed describes this course of the sun in the ecliptic, after such a change of its orbit, as *contrary* to that which it was before following in the milky way; and so it might be described to a certain extent: but the contrariety of the one to the other resides in the angle, in which the galaxy is inclined to the ecliptic, and not in the circumstance that a body moving in the one must have been moving from west to east, and moving in the other must have been moving from east to west.

In fact, so far as we have been able to discover, the traces of both these circumstances of the fable, as associated one with the other, and as making part of the same transaction, and as conspiring together to one and the same effect, are not to be met with any where in Grecian antiquity beyond the precincts of the tragic drama; from which we may infer

[s] Uranologium, 147. A. Achilles Tatius, Isagoge, 24. Cf. Plutarch, De Placitis Philosophorum, lib. iii. cap. i. Περὶ γαλαξίου κύκλου.

[t] i. 41. 98.

that, if both were not invented for the sake of dramatic effect, yet both were adopted and joined together for that purpose. Yet this adoption of both even for that purpose did not take place at once. In Æschylus, the oldest of the Greek tragedians of whom any works have descended to posterity, the banquet is clearly recognised as an accredited fact; but not the recession of the sun as connected with it in any manner whatsoever. And the former might be believed in Æschylus's time, (who was sixty years younger than Œnopides,) because as we have seen it was already current in the time of Œnopides; and yet no such fact as the going back of the sun might have yet come to be associated with it. In Sophocles, who comes next to Æschylus, we find one allusion to the banquet; but none to the recession of the sun. Euripides, the youngest of the three, is the first to join both together; and even to reverse the state of the case with respect to the distinction of the two things, as it appears in Æschylus, by making the going back of the sun the principal subject of his allusions, and by barely noticing the banquet in comparison of that: so that if Æschylus would seem to have been the first to introduce the story of the banquet on the stage, Euripides would seem to have been the first to combine it with the still more extraordinary circumstance of the recession of the sun*.

* i. Κλαιόμενα τάδε βρέφη, σφαγάς,
ὀπτάς τε σάρκας πρὸς πατρὸς βεβρωμένας[u].

Ὁρᾶτε τούσδε τοὺς δόμοις ἐφημένους
νέους, ὀνείρων προσφερεῖς μορφώμασι;
παῖδες, θανόντες ὡσπερεὶ πρὸς τῶν φίλων,
χεῖρας κρεῶν πλήθοντες οἰκείας βορᾶς,
σὺν ἐντέροις τε σπλάγχν' ἐποίκτιστον γέμος
πρέπουσ' ἔχοντες, ὧν πατὴρ ἐγεύσατο[x].

Ὑμνοῦσι δ' ὕμνον δώμασιν προσήμεναι
πρώταρχον ἄτην· ἐν μέρει δ' ἀπέπτυσαν
εὐνὰς ἀδελφοῦ τῷ πατοῦντι δυσμενεῖς[y].

Παιδοβόροι μὲν πρῶτον ὑπῆρξαν
μόχθοι τάλανές τε Θυέστου·
δεύτερον ἀνδρὸς βασίλεια πάθη, κ', τ. λ.[z]

[ii. Ἀτρέα

[u] Æschylus, Agam. 1096. [x] Ib. 1217: cf. 1242. 1500–1504. 1511. 1583–1602. [y] Ibid. 1191. [z] Choëphori, 1068.

Euripides was born on the day of the battle of Salamis, Sept. 30, B.C. 480, 230 years after the date of the second miracle. It is not improbable that even 230 years after the

ii. *Ἀτρέα δ' ὃς αὖ σ' ἔσπειρε δυσσεβέστατον,*
προθέντ' ἀδελφῷ δεῖπνον οἰκείων τέκνων[a].

Cf. the Electra, 504, 515, where no allusion occurs but to the death of Myrtilus.

iii. For the allusions in Euripides, see the Orestes, 995 sq.; also 812–815. 1008.

Ἔδαισε δ' οὖν νιν τέκν' ἀποκτείνας Ἀτρεύς[b].

Εἰκώ τ' ἐν ἱστοῖς ἡλίου μετάστασιν[c].

As to the similar allusions, which occur in later writers whether Greek or Roman, in a chronological point of view they are of no importance. They merely repeat what they had learnt from the Greek tragedians.

Natorumve epulas conversaque sidera retro
Ereptumque diem[d].

Vivi bustum memorare sepulcri,
Ructantemque patrem natos, solemque reversum,
Et cæcum sine luce diem[e].

Qualem fugiente per ortus
Sole Thyesteæ noctem sensere Mycenæ[f].

O Phœbe patiens fugeris retro licet,
Medioque ruptum merseris cœlo diem,
Sero occidisti[g].

Verterat currus licet
Sibi ipse Titan obvium ducens iter[h].

Quo terrarum superumque parens,
Cujus ad ortus noctis opacæ
Decus omne fugit, quo vertis iter,
Medioque diem perdis Olympo?[i]

Nondum seræ nuncius horæ
Nocturna vocat lumina vesper[k].....

[a] Sophocles, Ajax, 1293.
[b] Orestes, 15.
[c] Iphigenia in Tauris, 816.
[d] Manilius, iii. 18.
[e] Ib. v. 461.
[f] Lucan, Pharsalia, i. 544.
[g] Seneca Trag. Thyestes, 776.
[h] Ib. 784.
[i] Ib. 789.
[k] Ib. 794.

event some tradition of so remarkable a phenomenon might still be preserved among the Greeks. Still less improbable is it that, out of the multitudinous host which accompanied Xerxes in B. C. 480, comprehending not only Persians, but Egyptians, Babylonians, Tyrians, Sidonians, and (if the poet Chœrilus, quoted by Josephus*, is to be believed) even Jews;

Nondum in noctem vergente die
Tertia misit buccina signum,
Stupet ad subitæ tempora cœnæ
Nondum fessis bubus arator[l].

Impias epulas, detestabili parricidio furvum diem[m].

Οἰδίποδες διασσοί σε καὶ Ἠλέκτρη βαρύμηνις
καὶ δείπνοις ἐλαθεὶς Ἀτρέος ἠέλιος[n].

Et caligantes abrupto sole Mycenas[o].

Ante Thyesteis iterum conterrita mensis
Intercisa dies refugos vertetur in ortus[p].

Hoc facinus refugo damnavit sole Mycenas,
Avertitque diem[q].

Cum post has epulas repente flexis
Titan curribus occidens ad ortum
Convivam fugeret, diem fugaret[r].

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* For some account of the poet Chœrilus, see our Dissertations upon the Principles and Arrangement of an Harmony of the Gospels[s]. The passage to which we refer is the following[t]:

Τῶν δ' ὄπιθεν διέβαινε γένος θαυμαστὸν ἰδέσθαι,
γλῶσσαν μὲν Φοίνισσαν ἀπὸ στομάτων ἀφιέντες,
ᾤκουν δ' ἐν Σολύμοις ὄρεσι πλατέῃ παρὰ λίμνῃ.

Strabo has preserved a fragment from the same part of his poem, (the title of which was *Ἀθηναίων νίκη κατὰ Ξέρξου*,) the description of the followers of Xerxes, (whom Strabo in this reference, through mistake, calls Darius,) not taken however directly from Chœrilus, but from Ephorus[u]:

Καλεῖ δὲ (sc. *ὁ Ἔφορος*) *καὶ Χοίριλον, εἰπόντα ἐν τῇ διαβάσει τῆς σχεδίας ἣν ἔζευξε Δαρεῖος·*

l Seneca Trag. Thyestes, 798.

m Seneca Rhetor, Controversiæ, i. i. 79. Biponti.

n Anthologia, ii. 240. Statilius Flaccus, ix.

o Statius, Thebais, i. 325. Cf. ii. 184: iv. 307.

p Claudian, i. in Probini et Olybrii Consulatum, A. D. 395, v. 171.

q Ibid. xv. De Bello Gildonico, 399.

r Sidonius Apollinaris, ix. 111–113.

s App. Diss. iii. vol. iii. 334, note.

t Apud Joseph. contra Apion. i. 22. Cf. Eusebius, Præp. Evang. ix. 9. § 1. 359.

u vii. cap. iii.

(all from parts of the east where the last miracle in particular must have been long remembered;) many might be detained at Athens in the condition of slaves, from whom the curious and philosophical Euripides as he grew up might often hear the wonderful and almost incredible story of this most unexampled and extraordinary of natural phenomena, the going back of the sun in the heavens *.

> *Μηλονόμοι τε Σάκαι γενεᾷ Σκύθαι, αὐτὰρ ἔναιον*
> *'Ασίδα πυροφόρον, νομάδων γε μὲν ἦσαν ἄποικοι,*
> *ἀνθρώπων νομίμων.*

What appears to have been part of the proœm or exordium of his poem too is quoted by Aristotle in his Rhetorica [x]:

"Ετι δ' ἐκ τῶν δικανικῶν προοιμίων· τοῦτο δ' ἐστὶν ἐκ τῶν πρὸς τὸν ἀκροατὴν εἰ περὶ παραδόξου λόγος ἢ περὶ χαλεποῦ ἢ περὶ τεθρυλλημένου πολλοῖς ὥστε συγγνώμην ἔχειν· οἷον Χοίριλος·

> *Νῦν δ' ὅτε πάντα δέδασται.*

And a little further on [y] another fragment of some epic poem is quoted, without specifying the name of the author; which we should not hesitate to refer to the same proœm of Chœrilus:

> *"Ηγεό μοι λόγον ἄλλον, ὅπως 'Ασίας ἀπὸ γαίης*
> *ἦλθεν ἐς Εὐρώπην πόλεμος μέγας.*

That he was either himself a contemporary of Plato's, or that his poem was then in the acme of its reputation, (which is more probable,) appears from the following testimony of Proclus in Timæum [z]:

'Ηρακλείδης γοῦν ὁ Ποντικός φησιν, ὅτι τῶν Χοιρίλου (not *τῶν περὶ Χοίριλον*) *τότε εὐδοκιμούντων, Πλάτων τὰ 'Αντιμάχου προὐτίμησε, καὶ αὐτὸν ἔπεισε τὸν 'Ηρακλείδην εἰς Κολοφῶνα ἐλθόντα τὰ ποιήματα συλλέξαι τοῦ ἀνδρός.*

* Euripides was certainly the most philosophical of the Greek tragic poets: and had he merely heard of the fact in question, (from whatsoever quarter,) it must have been easy for him, and from the habitual tendency of his mind to search for the explanation of effects in their causes, it would be natural too, to connect it with the banquet of Thyestes, already in possession of the stage, by reasoning in some such manner as the following:

The most extraordinary of effects in external nature must be resolvable into equally extraordinary causes: and the most extraordinary of physical effects might still have its foundation in the most extraordinary of moral causes. What phenomenon so contrary to all experience, what spectacle so new and so unexampled, as the sun's moving back in the heavens? What scene so revolting to humanity, so abhorrent from the instincts of nature, so abominable to gods and men, as a father's devouring his children?

It would make little difference whether he himself really believed either of these things or not. It would be sufficient for his purpose that he had heard of the one and found the other in possession of the stage. He had

[x] Lib. iii. cap. xiv. 1414. l. 1. [y] l. 16. [z] A. (i.) 64 = 28. C.

Be this as it may, from his manner of referring to both these incidents it may be inferred that he was fully as sceptical about the domestic feud of the sons of Pelops, and its unnatural consequences, as about this particular phenomenon. In the Electra he makes the Chorus avow its belief in both; but in the Orestes, while he merely recognises the former, he puts the latter prominently forward.

It is very observable however that the circumstantial description of the phenomenon, both in the Orestes and in the Electra, is so remarkably in unison with the actual matter of fact B. C. 710; that it could scarcely have been more so, even had it been expressly derived from an authentic tradition. For, i. In this description too the recession is supposed to take place just before sunset; the sun being actually in the west, when it is supposed to turn back to the east [a].

ii. The sun actually goes back from west to east, according to the description, just the same as on the real occasion: and the effect which ensues, the addition of twelve hours to the length of the current day, is the same in either case.

iii. The extent of the anomaly on the real occasion was confined to one day; i. e. the natural law of the diurnal rotation was affected and superseded by it only for one day: and there is nothing in the description of the effect in Euripides, to imply that he could have supposed that it lasted more than one day on this occasion [b].

iv. The season of the year, at which the recession is supposed to take place in this description of it, is exactly the same at which the actual miracle took place B. C. 710. This

nothing to do but to join them together, whereby to adapt each of them so much the better to stage effect: and if they were to be joined together on the supposition of any natural connection between them, it must be in the manner and on the principle which we have just pointed out.

[a] *Ὅθεν Ἔρις τό τε πτερωτὸν*
ἁλίου μετέβαλεν ἅρμα,
τὰν πρὸς ἑσπέραν κέλευθον
οὐρανοῦ προσαρμόσασα
μονόπωλον ἐς Ἀῶ,
ἑπταπόρου τε δρόμημα Πελειάδος
εἰς ὁδὸν ἄλλαν Ζεὺς μεταβάλλει.
Orestes, 1001.

Τότε δὴ τότε φαει-
νὰς ἄστρων μετέβασ' ὁδοὺς
Ζεὺς καὶ φέγγος ἀελίου
λευκόν τε πρόσωπον ἀ-
οῦς, τὰ δ' ἕσπερα νῶτ' ἐλαύ-
νει θερμᾷ φλογὶ θεοπόρῳ.
Electra, 726.

[b] So the Scholiast (ex editione Aug. Matthiæ): *Τότε ἐς μονόπωλον ἀῶ, ἤγουν ἐς μίαν ἡμέραν, μετέβαλεν ὁ Ζεὺς τὴν πρὸς ἕσπερον κέλευθον τοῦ οὐρανοῦ, κ', τ. λ.* Cf. ad 800: 995.

is to be collected from the fact that the Pleiades go back in the description from west to east, as well as the sun; from which it follows that they too were previously in the west, as well as the sun; and therefore were either preceding the sun, or in conjunction with the sun. If the latter, then the supposed juncture of the recession is critically that of the cosmical rising of the Pleiads; if the former, it is that of their heliacal rising; or not earlier than that at least.

Now, in the solar Parapegma of Meton, (published at Athens in B. C. 432, twenty-six or twenty-seven years before the death of Euripides, which happened at the end of B. C. 406,) the cosmical rising of this constellation was attached to the Julian April 2; and the heliacal rising to the Julian May 6. And both in this calendar, and in every similar calendar among the Greeks which has come down to posterity, the heliacal rising of the Pleiades served as the natural terminator of the spring quarter, and as the natural epoch of the summer quarter of the year. It is well known that Hesiod specifies this phenomenon in his own time as the test and criterion of the ripeness of barley harvest for the latitude of Ascra in Bœotia: and assuming his time to have been about B. C. 800, Mr. Ideler has calculated both the cosmical and the heliacal rising of the constellation Pleiades for the parallel of 38° N.: and determined the former to April 4, the latter to May 19.

These dates would suit almost equally well for the latitude of Athens, 37°. 58′. 8″. N.; and for B. C. 710. It is quite certain that for these latitudes the Pleiades must have been rising two hours of mean time at least before the sun, on the morning of May 31, B. C. 710; and therefore in the natural course of things must have been setting as long before the sun in the evening of that day;—had not they too as well as the sun been carried back from west to east, just when they were setting, or just after they were set. For it may be calculated that the precise time of the miracle, in mean time, 6 P. M. at Jerusalem, would be 5 h. 14 min. 9 sec. P. M. at Athens. And as the sun would rise there on the morning of May 31 about 4 h. 50. m. A. M. apparent time, and set about 7 h. 10 m. P. M. apparent time, 7 h. 0 m. P. M. mean

time, the date of the miracle at Athens would be about 1 h. 45 m. 51 sec. of mean time before sunset *.

* We cannot take our leave of this subject of the testimony of Grecian tradition to one or both of the miracles of Scripture, without adverting to a well known passage of Plato, which has often been quoted, but has never yet been explained on this principle.

Ἦν τοίνυν καὶ ἔτι ἔσται τῶν πάλαι λεχθέντων πολλά τε ἄλλα καὶ δὴ καὶ τὸ περὶ τὴν Ἀτρέως τε καὶ Θυέστου λεχθεῖσαν ἔριν φάσμα· ἀκήκοας γάρ που καὶ ἀπομνημονεύεις ὅ φασι γενέσθαι τότε. ΝΕ. ΣΩ. Τὸ *περὶ τῆς χρυσῆς ἀρνὸς ἴσως σημεῖον φράζεις.* ΞΕΝ. Οὐδ*αμῶς. ἀλλὰ τὸ περὶ τῆς μεταβολῆς δύσεώς τε καὶ ἀνατολῆς ἡλίου καὶ τῶν ἄλλων ἄστρων· ὡς ἄρα ὅθεν μὲν ἀνατέλλει νῦν εἰς τοῦτον τότε τὸν τόπον ἐδύετο, ἀνέτελλε δ' ἐκ τοῦ ἐναντίου. τότε δὲ δὴ μαρτυρήσας ἄρα ὁ θεὸς* Ἀ*τρεῖ μετέβαλεν αὐτὸ ἐπὶ τὸ νῦν σχῆμα.* ΝΕ. ΣΩ. *Λέγεται γὰρ οὖν δὴ καὶ τοῦτο.* Opp. pars ii. vol. ii. 271 (= 268). l. 20. Politicus.

This tradition is certainly connected here too with the fabulous contest of Atreus and Thyestes: but there is no connection in this instance between it and the banquet; nor even distinctly between it and the story of the golden ram. The value of this tradition resides in the circumstance that it recognises it as a fact, handed down from antiquity, and on the authority of antiquity, that sometime or other, (whatsoever had been the reason of the effect itself,) the risings and settings of the sun and of the stars had undergone a change; the east had been turned into the west, and the west into the east. With respect to the stars in particular, this is no more than a literal account of what must have appeared to have happened by virtue of the second miracle. If that second miracle actually happened, and in the manner in which we have explained it, including an instantaneous reversion of the heavens to the extent of half an entire circumference, it is impossible but that this particular consequence to the stars must have appeared to have followed upon it. All must have appeared to have been set back 180 degrees in space, 12 hours in time. What was this but to turn their settings into their risings, and their risings into their settings, according to the literal tenor of the tradition reported by Plato?

The scholiasts and commentators of antiquity explain the fable of the sun's going back in the time of Atreus, by telling us that Atreus was an astronomer, and the first person who discovered the theory of solar eclipses, or the real direction of the motion of the sun, in opposition to that of the heavens, that is, from west to east, instead of from east to west[c]. For example, Lucian, De Astrologia[d]: *Ἀτρέως δὲ καὶ Θυέστεω περὶ τῇ πατρῴῃ βασιληΐῃ φιλονεικεόντων . . . τὸ ξυνὸν τῶν Ἀργείων ἄρχειν ἔγνωσαν ἑωυτῶν ὅστις τοῦ ἑτέρου σοφίην προφερέστερος. ἔνθα δὴ Θυέστης μὲν κριόν σφισι τὸν ἐν τῷ οὐρανῷ σημηνάμενος ὑπέδειξεν· ἀπὸ τέω δὴ ἄρνα χρυσέον Θυέστῃ γενέσθαι μυθολογέουσι. Ἀτρεὺς δὲ τοῦ ἠελίου πέρι καὶ τῶν ἀνατολέων αὐτοῦ λόγον ἐποιήσατο, ὅτι οὐκ ἐς ὁμοίην φορὴν ἠέλιός τε καὶ ὁ κόσμος κινέονται,*

c Scholia ad Iliad. B. 106: Servius ad Æneid. i. 548: Polybius apud Strabon. i. cap. ii.: Hyginus, Fabb. lxxxviii. Atreus; cclviii. Atreus et Thyestes.

d Opp. ii. 365, Astrolog. 12.

SECTION IV.—iii. *Change of the primitive rule of the reckoning of the noctidiurnal cycle in particular instances.*

If the reckoning of the noctidiurnal cycle according to the primitive rule, that is from sunset, before the date of either of the miracles of Scripture, had already been connected with certain religious opinions, or with certain civil

ἀλλ' ἐς ἀντίξοον ἀλλήλοισι ἀντιδρομέουσι, καὶ αἱ νῦν δύσιες δοκέουσαι, τοῦ κόσμου δύσιες ἐοῦσαι, τοῦ ἠελίου ἀνατολαί εἰσι· τάδε εἰπόντα βασιλῆά μιν Ἀργεῖοι ἐποιήσαντο.

In this case it is difficult to assign a reason why the going back in his time should have been limited to one day. Eustathius says it is "a figure of speech;" and that what takes place every day, by a poetical license, is thus supposed to take place once for all on some one day: Τὸ γοῦν ἀεὶ φύσει γινόμενον ἰδικῶς ἄρτι γενέσθαι πλάττει· ὁποῖόν τι καὶ τὸ τὸν Ἀτρέα καταναγκάσαι τὸν τοῦ ἡλίου δρόμον καὶ ἐξ ἀνατολῆς τρέψαι ἐς δύσιν. κἀκεῖνο γὰρ ἀεὶ γινόμενον ὁμῶς ἅπαξ ποτέ φησιν ὁ μῦθος γενέσθαι. But how will this explain the connection of the recession for this one day with the banquet of Thyestes on this one day also?

After what has been said, especially of the true time of the year at which the phenomenon is supposed by Euripides to have taken place, the following passage of the Scholia on the Orestes[e] may be more intelligible, and may have its use in illustration of the present question: Πιθανῶς δὲ ὁ Εὐριπίδης τὸν μῦθον προσήρμοσεν. ὁ γὰρ φυσικὸς λόγος τὸν ἥλιον ἀποδείκνυσι τὴν ἐναντίαν πορείαν ἰόντα τῷ οὐρανῷ. φησὶ γὰρ ὅτι πρότερον ἐκ καρκίνου εἰς διδύμους ἐποιεῖτο τὴν πορείαν (from east to west) ὥστε τὸν σωματοειδῆ ἥλιον ἀπεστραφέναι πρὸς τὴν δύσιν τὸ πρόσωπον. νῦν δὲ διὰ τὴν τοῦ Ἀτρέως καὶ Θυέστου ἀδικίαν ἀποστραφέντα πρὸς ἀνατολὴν φέρεσθαι, ἔχοντα φαινόμενον ἡμῖν τὸν νῶτον. διόπερ τὴν μὲν δύσιν αὐτῷ γενέσθαι ἀνατολὴν τὴν δὲ ἀνατολὴν δύσιν.

There is nothing in Euripides about Cancer and Gemini; yet the Scholiast assumes that the sun was previously in Cancer travelling towards Gemini, when he turned back on this occasion and began to journey towards Cancer. He must have inferred then that the supposed time of this change of motion, according to the description in Euripides, was when the sun was on the confines of Taurus and Gemini, or of Gemini and Cancer.

We may conclude these observations of ours on the connection of *one* scriptural fact with the Greek drama, and with the fabulous fortunes of the house of Pelops, by directing the attention of the curious reader to something else of the same kind—the connection of the miraculous darkness at the crucifixion with the death of Julius Cæsar.

That the year in which the dictator Cæsar was assassinated did exhibit some remarkable phenomenon, that the light of the sun in particular all through it was unusually dim and obscure, is a well attested fact. Plu-

[e] Ad v. 989.

institutions; in particular if it was any where previously reckoned according to this rule in periods of 24 hours of mean time perpetually; it is evident that nothing would

tarch mentions it in his life of Cæsar[f]. Speaking of the sun Virgil observes,

> Ille etiam exstincto miseratus Cæsare Romam,
> Quum caput obscura nitidum ferrugine texit,
> Inpiaque æternam timuerunt sæcula noctem[g].

> Ipsum etiam solem defectum lumine vidit
> Jungere pallentes nubilus annus equos[h].

> Phœbi quoque tristis imago
> Lurida sollicitis præbebat lumina terris[i].

M. Antonio P. Dolabella Coss. (B. C. 44).... multis mensibus languida lux fuit[k]—Cujus corpore pro rostris posito sol orbem suum celasse dicitur[l]. Hence even in the decree of Mark Antony, passed at Ephesus B.C. 42, (after Philippi,) in allusion to the same events: *Δι' ἃ καὶ τὸν ἥλιον ἀπεστράφθαι δοκοῦμεν, ὃς καὶ αὐτὸς ἀηδῶς ἐπεῖδε τὸ ἐπὶ Καίσαρι μῦσος*[m].

Now, the old Scholiast on Lucan[n] (himself much later than the time of Lucan, and, as may be collected from various allusions in his commentary on him, a Christian) observes: Hoc ideo dicit, quia sol pridie *iduum Majarum* defectum passus est ab *hora sexta* usque ad *noctem*. Servius, on the passage quoted from Virgil supra, has this remark: Constat autem occiso Cæsare in senatu *pridie iduum Martiarum* solis fuisse defectum ab *hora sexta* usque ad *nonam*: quod quia multis protractum est horis dicit in sequentibus,

> æternam timuerunt sæcula noctem.

From which we may infer that the text of the Scholiast on Lucan is to be corrected pridie iduum Martiarum also, though there is a various reading in the text of Servius of "iduum Majarum" too. Servius, it is true, has another date for the death of Cæsar: Et caussa scribendorum Bucolicorum hæc est: cum post occisum iii iduum Martiarum die in senatu Cæsarem[o]—This particular inconsistency however is of no importance to the present question. Now Servius asserts with confidence (constat) that there was a solar eclipse on the day of the death of Cæsar from *noon* to the *ninth* hour; and yet the moon was new only on the 19th or 20th of March that year, not on the 15th.

What then is the foundation of so confident an assertion? We can ima-

f lxix.

g Georgica, i. 466.

h Tibullus, ii. v. 75.

i Ovid, Metam. xv. 785.

k Obsequens, De Prodigiis, cxxviii. Cf. Pliny, H. N. ii. 30.

l Auctor De viris illustribus, Julius Cæsar.

m Josephus, Ant. Jud. xiv. xii. 3.

n Pharsalia, i. 541.

o Comm. in Bucolica, Præfatio: cf. the Vita per Donatum, p. xii. which Servius follows here ad litteram; and where also the old reading is die tertio iduum Martiarum.

be so directly affected by the solstice of Joshua or by the solar retrogradation of Hezekiah as those religious opinions or civil customs, so connected with this cycle and with its peculiar rule; or as this cycle itself and its particular measure.

With respect to the first of these suppositions; we know not how far such a connection with something extraneous to itself might or might not be the case, in some part of the world or other, even in the time of Joshua: but so far as we have been able to discover there does not appear to be any reason for supposing it was yet the case anywhere, not even in Egypt itself. With regard to the second; even to assume that such might be the rule of the reckoning of the cycle in some instance or other in the time of Joshua, yet as the sensible distinction of night and day, and the usual succession of one after the other, were not affected even by the first miracle; we see no reason why the same kind of reckoning of the cycle, and according to the same measure and standard supplied by the period of 24 hours, might not be continued after this temporary interruption, and go on just in the same manner in general as before.

But at the time of the second miracle, 810 years later than the first, the state of the case was very different. In the course of this interval of time greater changes had taken place in men's notions and opinions on various important points, affecting both their religious belief and their moral practice, than in any similar period, which could be specified, between the beginning of things itself and the Gospel æra. Astrology, (that fond and delusive, but powerful and influen-

gine nothing so probable as the miraculous darkness from noon to the ninth hour, at the time of the Passion. Not that we believe that this phenomenon, miraculous as it was, was visible any where at the time, except in Judæa. But between the time of the Passion and the time of Servius, (nearly 400 years,) whether from ignorance of the truth, or through confusion of things at first sight something the same, or through flattery to the memory of Julius Cæsar, or enmity to Christianity and a desire to get rid of one of the miraculous evidences of its truth, or from any other conceivable motive; it is possible that this darkness at the crucifixion might have come to be associated with the historical fact of the unusual appearance of the sun in the year of the death of Cæsar; and in Servius' time might even be currently believed to have been a concomitant of that event.

tial, creation of the human sense of sympathy with the unknown, the mysterious, and the sublime, but still the sensible and the visible,) had been brought into being by men for themselves; and had been erected into a science, on the dogmas of which the destinies of individuals and of communities were supposed to depend. Innumerable forms and phases of a common idolatry had appeared. Times and seasons had come to be associated with particular influences and particular observances. The course of time itself had begun to be more narrowly watched, more attentively studied, more accurately measured and numbered perpetually. The calendar in various quarters had undergone modifications and changes, the impress of which, in such cases as have survived long enough, it retains to the present day. In short, great revolutions, both moral and religious and political as well as natural, had taken place in these 800 years; and great had been the progress made in that onward course which seems to be the law of society in every state and at every period of its existence; and by which all things human are affected sometimes for the better, but oftener for the worse. Nothing therefore can be conceived more improbable *a priori* than the occurrence of a second interruption of the regular succession of night and day, which should leave no memento of itself behind it, not even in its effect on the reckoning of night and day itself.

In Egypt in particular this second interruption does not appear to have produced any change in the primitive rule of the reckoning; which may be accounted for probably in two ways, without prejudice to the truth and reasonableness of what we have just been observing. i. It is possible, and in our opinion it is even probable, that the remembrance of the fact of the same kind of interruption once before was better preserved in Egypt than in any part of the ancient world, except the Holy Land; and the recollection of that first interrruption would be the very thing to satisfy the Egyptians that the same kind of interruption again, instead of being a fresh or a permanent disturbance of the primitive rule of the cycle, was in reality a restoration and a reestablishment of it. ii. It probably was now, and long had been, a principle of religion among the Egyptians to change nothing

of which nature appeared to have been the author and appointer; much less such obviously natural as well as established constitutions as the year, the month, and the day, the annual, the menstrual, and the noctidiurnal cycle: and therefore, in whatsoever state the cycle of night and day was seen to have been left after this second affection thereof, or by virtue of it, in that it would be a point of religion with them to take it up and to continue it. Such at least is the reason commonly assigned by the ancients, (no doubt as they had learnt from the Egyptians,) why they did not venture to arrest and fix the primitive cyclical reckoning among themselves by any such law as that of the Julian calendar; the principle of which notwithstanding was very well known to them nearly 2000 years before it was applied and carried out in practice in the Julian correction of the dictator Cæsar; and why they preferred that their rites and ceremonies, though perpetually attached to the same days of the month, should not be perpetually attached to the same seasons of the year, but should circulate with the calendar all round the natural year; and that every civil day, with every thing which there was to consecrate or to distinguish it in any manner soever, should fall on every natural day (i. e. every day in the natural year) in its turn.

Among the other nations of antiquity however different principles of administration regulated the calendar; and different reasons and considerations, religious or political, required a different rule. We have seen that in certain instances the primitive reckoning of the noctidiurnal cycle in the course of time must have experienced a change; and these cases of exception to the rule appeared to be those of the Persians, the Babylonians, the Romans, the Etruscans, the Hindus, and the Chinese. We have observed too that the epoch of these changes could very probably be ascertained; and that the reasons or motives in which they were founded could very probably be pointed out. In our opinion this time was the date of the second miracle; and these reasons were either the interruption, thereby occasioned, in the reckoning of the cycle of night and day, as it was previously going on; an interruption affecting other things which did not admit of being disturbed, as well as the reckoning of the cycle

itself, and to which consequently the reckoning of the cycle must be accommodated in some manner or other afresh, since they could not be modified or changed themselves in accommodation to the interruption of the reckoning: or some other conceivable motive, arising out of the fact of the disturbance itself. In confirmation of this opinion we propose briefly to consider each of these cases in its turn.

SECTION V.—i. *Change of the Persian rule.*

The Persian correction of the primitive calendar, as we hope to shew in due time, is to be dated B. C. 702. It was consequently eight years later than the miracle of Hezekiah. Its reputed author among the Persians was an ancient king whom they call Gjemschid. On this point all our original authorities are agreed. Along with the correction of the calendar at this time a particular rule of religious observances, a proper ecclesiastical ritual, was introduced also, and was associated with it from the first: but it does not appear that the author of the correction of the calendar was the author of this system also; though he adopted it, and incorporated it in his correction. The true author of this system was the Zoroaster or Zerdusht of antiquity; not the younger of that name, the contemporary of Hystaspes (the father of Darius) or of Cyrus, but an older legislator also so called—of Bactria too, not of Persia; and who though much more ancient than the younger Zoroaster, was yet some hundred years later than the time of Joshua. But on this point particular proofs or explanations must be reserved for the consideration of the Persian calendar.

Now according to this theological and this ritual or liturgical system, thus connected with the correction of Gjemschid and with the earlier correction of the Bactrian reformer and legislator; each of the twelve months of the year, and each of the thirty days of the month, were subject to the regency of the Supreme Principle, (called Ormuzd or Hormuzd, and also Dey,) and, under his superintendence, to that of thirty subordinate principles, inferior as compared to him, but superior to man, of the nature of angels, or δαίμονες; which the Persians called Yezeds or Izeds. Or to speak more cor-

rectly, each month of the calendar, with its proper quota of days, was subject to the Supreme Principle, and to twenty-six of these Izeds with names of their own, and to three others, which bore names of a compound nature, one of the elements of which was Dey, the name of the Supreme Principle himself; implying thereby that these three stood in a nearer relation to him than the rest even of the class of beings to which they themselves belonged. And this peculiar relation was further intimated by the fact that the days in each month, which belonged to the Supreme Principle, and to these three of the Izeds in particular in contradistinction to the rest, were *Sabbaths.* No day however of one of these Persian months could have more than one proper regent. Every 24 hours of mean or of apparent time belonged to some one of these Izeds, and to a different one in each instance; and to whichsoever among them they belonged, they were totally and entirely his. They could not be divided between him and any other before or after him.

The latitude of the ancient Persepolis being assumed, according to D'Anville, at 30° N. and its longitude at 71° east of Faro, 51° east of Paris; the difference of meridians between Persepolis and Jerusalem may be assumed at 1 h. 12 m. 35 sec. of mean time *east.*

	h.	m.	sec.	
Hence May 31, B. C. 710, at Jerusalem, mean time	18	0	0	
Meridians	+ 1	12	35	
At Persepolis	19	12	35	
Cast off 12 h.	12	0	0	
Restitution of the sun	7	12	35	A. M. mean time.

It may be assumed that the sun would rise at Persepolis on May 31, B.C. 710, about 5 h. 10 m. A. M. apparent time, independent of refraction, i. e. about 5 h. 0 min. mean time; and set about 6h. 50 m. P. M. apparent time, 6. 40. P. M. mean time. Evening therefore must have set in, and along with evening the proper service of the Ized which was then in course, about 33 m. before the miracle took place.

What then was to be done, when the evening was suddenly turned into the morning? What could be done, except to continue the service virtually as if from evening, but *de*

facto as if from morning? And this having begun to be done in this one instance from the necessity of the case, it must be done in every subsequent case of the same kind. We thus naturally and easily account for the change of the rule of the noctidiurnal reckoning in Persia, from sunset to sunrise; but only in connection with their purely ritual, their purely ecclesiastical, in one word their theological and religious system. It does not appear that the change *did* affect the rule of the cycle in common life; and it is manifest that, as so produced, it was no necessary consequence of the effect that it should.

SECTION VI.—ii. *Change of the Babylonian and Chaldean rule.*

Among the Chaldeans or Babylonians, on the contrary, judicial astrology more particularly, before the date of this second miracle, had already been elaborated into a compact and consistent scheme, deserving the name of a science such as it was. It is in our power, with great probability, to assign the time when this system was completed; and in particular to demonstrate the fact of a connection from the first between the principles and application of the science and the period of 24 hours of mean time. It follows that every moment of time, from the beginning to the end of the noctidiurnal cycle, from the beginning to the end of the menstrual, from the beginning to the end of the annual, on the very principles of the science itself, must have been fatally and therefore indissolubly associated with its proper sidereal influence; and that the sidereal influence over or sympathy with one day could not possibly be transferred to another.

Now the meridian of the ancient Babylon not being materially different from that of the modern Bagdad; it may be assumed to have been 36 m. 44 sec. of mean time *east* of Jerusalem.

	h.	m.	s.	
Hence at Jerusalem, May 31, B. C. 710 ..	18	0	0	mean time.
Meridians	+ 0	36	44	
At Babylon, May 31	18	36	44	mean time.
Cast off	12	0	0	
Restitution of the sun	6	36	44	A. M. mean time.

It may be assumed also that the sun would rise at

Babylon, (in latitude 33° 19′ 50″ N.,) on the morning of this day, about 5 h. 3 m. apparent time, (independent of refraction,) about 4 h. 53 m. mean time: and set about 6 h. 57 m. P. M. apparent time, about 6 h. 47 m. P. M. mean time. The miracle then at Babylon would take effect about 10 m. 16 sec. before sunset; i. e. just at the end of the last hour of day in apparent time. What was to be done then when 6 h. 36 m. 44 s. P. M. of mean time suddenly and all at once became 6 h. 36 m. 44 s. A. M. of mean time? What could be done except to transfer the Decanal and Stellar influences, before associated with 6 h. 36 m. 44 s. P. M. to 6 h. 36 m. 44 s. A. M., as still virtually the same with the former, though nominally different from it? And thus we should account for the change of the noctidiurnal rule among the Chaldeans too; as the effect of the disturbance produced by the miracle in the relations of the cycle of night and day to their system of judicial astrology. Yet there would be no reason to infer from this fact that a change so produced would extend to the reckoning of the cycle in common life, even at Babylon. It would be confined to the schools and colleges and observatories of the Chaldeans and stargazers, (the monthly stargazers and prognosticators there, as Scripture styles them).

SECTION VII.—iii. *Change of the Indian or Hindu rule.*

The acquaintance of the Greeks with India, in the time of Alexander the Great, was confined to India on this side the Ganges; or to what is now called the Punjaub, or five river country. In the reign of Seleucus Nicator their knowledge of the country was extended beyond the Ganges, into Hindustanee proper; by passing into the dominions of Sandrocottus, and as far as his capital, the ancient Palibothra; the site of which was very little removed from that of the modern Benares.

We may admit that when Alexander came among the inhabitants of the Punjaub the Gymnosophists of that quarter, like the modern Brahmins in general, (and perhaps the people of the country too,) were reckoning the noctidiurnal cycle from sunrise. If we may fix on Taxila, (the modern Attock[p],) as the principal city of the Punjaub at this time,

[p] D'Anville, Ancient Geography, ii. 101.

and possibly before this time; its latitude, according to D'Anville, was 32° 30′ N., and its longitude 88° east of Faro, 68° east of Paris: consequently, 2 h. 20 m. 35 sec. of mean time east of Jerusalem.

	h.	m.	s.	
Hence at Jerusalem, B. C. 710, May 31 ..	18	0	0	mean time.
	+ 2	20	35	
At Taxila, May 31	20	20	35	mean time.
	− 12	0	0	
Restitution of the sun, May 31, at ..	8	20	35	mean time.

The sun would rise at Taxila, on the morning of this day, cir. 5 h. 4 m. apparent time, (exclusive of refraction,) about 4 h. 54 m. mean time: and would set about 6 h. 56 m. P. M. apparent time, about 6 h. 46 m. P. M. mean time. The miracle then would take place and the restitution be complete about 1 h. 34 m. 35 sec. after the beginning of night according to the primitive rule. The astronomers and Brahmins of the time would have to determine whether they should call this date (8. 20. 35. A. M.) the fourth hour of a new noctidiurnal cycle, or the sixteenth of an old. They appear to have decided on the former; and therefore to have begun a new reckoning of the cycle, ever after, from the epoch of sunrise on this day.

The effect would be much the same at Palibothra. The latitude of this place being assumed at 26° N., its longitude at 79° east of Paris, its meridian was 3 h. 4 m. 35 sec. east of Jerusalem.

	h.	m.	s.	
Hence at Jerusalem, B. C. 710, May 31 ..	18	0	0	mean time.
	+ 3	4	35	
At Palibothra, May 31	21	4	35	mean time.
	− 12	0	0	
Restitution of the sun, May 31 ..	9	4	35	A. M.

Sunrise at Palibothra, on this day, may be assumed about 5 h. 17 m. P. M. apparent, 5 h. 7 m. A. M. mean, time: sunset, about 6 h. 43 m. P. M. apparent time, 6 h. 33 m. mean. The miracle therefore would take effect there, 2 h. 31 m. 35 sec. after sunset or the beginning of night. So that in this case too the alternative would be, whether the precise time of the restitution should be treated as such and such an hour of a new cycle, dated from sunset or from sunrise: and reason

and common sense decided in this case also in the same way; viz. that the current hour of night should now become, and be treated as, the corresponding hour of day. If so, a new reckoning of the noctidiurnal cycle itself would begin *de facto* from sunrise, on the morning of this day.

SECTION VIII. iv.—*Change of the Roman, and of the Etruscan rule.*

The date of the death of Romulus, as we hope to demonstrate hereafter, was May 26, B. C. 715. That of the succession of Numa Pompilius may be assumed as B. C. 714 or B. C. 713. The second miracle therefore undoubtedly happened in his reign: and as dated in terms of his calendar, which came into being Feb. 17, B. C. 712, it was cycle i. 3: iii Idus Maias, May 13 in the Roman style of that time, May 31 in the Julian of that and of all time.

This day is distinguished in the Roman calendar ostensibly only by the circumstance of its being the last of the Lemuria; which began on the 9th and ended on the 13th of the Roman May[q]. The description which Ovid has left of these *sacra* plainly implies that they were *Parentalia*, or funereal services; and were dedicated to the Dii Manes: and *this* in the month of May, and by the appointment of Numa, (who is known to have purposely assigned every thing of that kind, distinct from these, to February, the last month in his calendar,) is something extraordinary. They were celebrated critically at midnight too[r]: which is another remarkable circumstance. The temples, and *fana* or chapels, were shut up and closed while these *sacra* lasted[s], or for those days on which they were going on more particularly; for they were in reality celebrated at intervals. A prejudice against marrying in the month of May too existed of old among the Romans[t]: the origin of which appears to have had some connection with the Lemuria in this month also.

We do not undertake to say that all this was the consequence at Rome, and among the Romans, of the remarkable event of this day, May 31 Julian, May 13 Roman for the

[q] Ovid, Fasti, v. 419–491. Cf. the Kalendaria, apud Foggini (Fasti Verrii Flacci. Romæ 1779). The Maffeian and the Venusine.

[r] Ibid. v. 429.

[s] Ibid. 485.

[t] Ibid. 487–490. Cf. Plutarch, Quæstiones Romanæ, lxxxvi.

time being: but we have a strong opinion that it was, and that the near and close and perceptible coincidence between the time and circumstances of this miracle, and the time and circumstances of the death of Romulus only five years before, (forcibly recalled thereby to the recollection of Numa and of his contemporaries, and working on those superstitious sensibilities founded in a deep sense of religion and in the conviction of the constant presence and constant control of a Providence in and over the affairs of men, which characterized the ancient Romans,) led to the institution of the Lemuria themselves *in* this month, and *on* these days, as an atonement to the Manes of Romulus, and as a means of appeasing the wrath of the offended gods*.

* The Julian date of the death of Romulus was May 26, B. C. 715, the date also of a solar eclipse of unusual magnitude at Rome. In his own calendar it was the 7th of the month Quinctilis, reckoned from midnight: the same day which was afterwards known by the name of the Nonæ Quinctiles. In the primitive calendar it was the 8th of Chœac, reckoned from midnight; but if his death happened at sunset or soon after, according to the primitive rule it would be reckoned the 9th of Chœac, as supposed to bear date from sunset; the Julian date, answering to the day of the death, whether Chœac 8 or Chœac 9, being still the same, May 26.

The calendar of Romulus was nundinal. Its relation to the primitive equable calendar was such, that in five years of the latter and in six of those of Romulus, a given date in his calendar returned to the same relation to a given date in the primitive, within one day. By virtue of a singular coincidence, it happened that the first year, after the death of Romulus, in which this could be the case, was the year of the second of the two miracles of Scripture, B. C. 710. The kalends of March, in Romulus' calendar, B. C. 715, fell on Jan. 20, and B. C. 710 on January 18: the latter of which was the same cyclical date, within one day, B. C. 710, as B. C. 715.

The anniversary of his death, in the style of his own calendar, B. C. 710, Quinctilis 7, was consequently May 24. In the primitive calendar, supposed to be Chœac 9, reckoned from midnight, it would be May 26; the same Julian date this year as B. C. 715. In the primitive calendar Chœac was the fourth month; and in the calendar of Numa Maius or May was the fourth month too: and the 9th of the latter answered this year to May 27, as the 9th of the former did to May 26.

Now the first day of the Lemuria in the old Roman calendar, that is in the calendar of Numa, was fixed to the 9th of Maius or May, the vii Idus Maias. But it was peculiar to this ceremony to be celebrated for three days: yet not on three consecutive days, only on every other day. There was one day interposed between the first and the second, and another

The meridian of Rome is 1 h. 31 m. 58 sec. of mean time *west* of that of Jerusalem.

	h.	m.	s.	
Hence at Jerusalem, B. C. 710, May 31 ..	18	0	0	mean time.
	−1	31	58	
At Rome, May 31	16	28	2	mean time.
	−12	0	0	
Restitution of the sun, May 31 ..	4	28	2	A. M.

Sunrise at Rome on this day may be assumed about 4h. 40m. A. M. apparent time, (independent of refraction,) 4h. 30m.

between the second and the third; neither of which in strictness belonged to the Lemuria. This may be collected both from Ovid and from the fragments of the Julian calendar, such as are still extant for the month of May. The first day consequently in the Roman style was vii Idus Maias, May 9; the second was v Idus Maias, May 11; and the third iii Idus Maias, May 13: and these three days in the Roman calendar, B. C. 710, corresponded to May 27, May 29, and May 31 Julian respectively.

One cannot help suspecting from these coincidences that there was some connection between the institution of the Lemuria and the death of Romulus; and that the moving cause of the institution itself was the miracle which happened B. C. 710, on May 31. The circumstances of the miracle could not fail to remind the Romans of the death of Romulus; since in every thing but the fact of the eclipse of the sun, there was a striking resemblance between the circumstances of both events. The time of the day was the same in each instance; between the ninth or tenth hour and sunset. The sun and the moon were in conjunction at that time before, and they would be supposed to be in conjunction or to be approaching to a conjunction at the same time now. Nothing was wanting, to complete the analogy, except the eclipse. We should forget all we have learnt of the character of the ancient Romans, could we suppose that such coincidences as these, confirmed and rivetted by the fact of the miracle, and by the sun's instantaneous recession from the west to the east, just as it seemed to be again coming to a conjunction with the moon this year, at the same time of the day at which Romulus had disappeared five years before, would fail to make a deep impression upon them, and forcibly to remind them of the circumstances of his disappearance itself.

It thus appears that there were three dates of the death of Romulus, according to three different calendars; each of them more or less coincident with the other two, at this time: the nundinal Quinctilis 7, the primitive Chœac 9, and the Pompilian May 9. Of these that which nominally represented the date of his death was the nundinal; that which truly represented it, (because the same with the Julian date of his death,) was the primitive. Between these the difference was two days, that of May 24 and May 26. And between this true date of the death of Romulus, the primitive Chœac 9 or

mean: sunset at about 7 h. 20 m. P. M. apparent, 7 h. 10m. P. M. mean time: The miracle therefore would take place

Julian May 26, and that of the lunar conjunction this year, (answering to the same natural phenomenon in the year of his death, viz. May 31,) the interval including both was six days. On these coincidences, it appears to us, Numa founded the rule of the Lemuria; appointing them to last for the interval from May 26 to May 31; but so that the first day of the ceremony so called should fall on the second day of this interval, May 27, (the ninth of his own May, the date of the death in his own calendar as supposed to answer to the primitive calendar,) the second on the fourth, May 29, the 11th of his own May, and the third and last on the sixth, May 31, the 13th of his own May.

We may conclude too with great probability that the change in the rule of the reckoning of the noctidiurnal cycle, as made by Numa and for such purposes as he was contemplating by the change itself, took place at this time; and is ultimately to be traced to the same reasons and motives as those which led to the institution of the Lemuria. It may very reasonably be presumed that, as his own calendar had been directly derived from the primitive only two years before this time; and as his kalends of January at that time were absolutely the same with the first of the primitive Thoth; the ninth of his fourth month May might very properly still be considered the representative of the ninth of the fourth primitive month; and in fact, as we have seen, there was only one day's difference between them at this very time; the ninth of his May being May 27, the ninth of Chœac May 26. We may infer from this fact that the true cyclical date of the death of Romulus was supposed to be the ninth of the fourth month. Now the ninth of this month B. C. 715, dated from sunset according to the primitive rule, actually coincided with May 26: and if Romulus really disappeared at or after sunset, or at least not before sunset, May 26, B. C. 715—then according to the primitive rule the date of his death would strictly be the ninth of the primitive Chœac as reckoned from sunset; the Julian May 26. Suppose however the rule of the cycle changed B. C. 710 from sunset to midnight; and this change of rule to be carried back from B. C. 710 to B. C. 715, the year of the death of Romulus. Must the ninth of Chœac in that case be set back to May 26 at midnight or forward to May 27 at midnight? Common sense would imply the latter; and that May 26 reckoned from midnight under these circumstances would be supposed to belong to Chœac 8, not to Chœac 9: which under similar circumstances must be reckoned only from May 27 at midnight.

Now this being the case, though Numa could not be ignorant that the true date of the death of Romulus, reckoned according to the primitive rule, was May 26; it is evident also that, if that rule was changed at this time from sunset to midnight, it must be reckoned as May 27: and since May 27 was both the date of Chœac 9 B. C. 715, reckoned according to this rule, and the date of May 9 in his own calendar, (the proper representative of Chœac 9, according to such a rule and in the Roman calendar,

about 2 h. 41 m. 58 sec. before sunset, towards the middle of the *tenth* hour of the day: the restitution as nearly as possible at sunrise, or at what had been the beginning of the first hour.

It might have been expected *a priori* then that, under

B. C. 710,) these coincidences, in our opinion, do strongly imply that the change of the rule from sunset to midnight was really made at this time; as a consequence of the miracle indeed, but from that supposed connection of the miracle itself with the death of Romulus which led to the institution of the Lemuria.

The word Lemures in the old Roman language appears to have been used as a general denomination for *Ghosts:*

Mox etiam Lemures animas dixere silentum:
Is verbi sensus vis ea vocis erat. Ovid, Fasti, v. 483.

That is, they were strictly departed spirits[a]—which were denoted by the word. Popular superstition has been every where inclined to believe that such ghosts or spirits, in the case of those who had come by a violent and an unjust end, could not rest in their graves until vengeance had been inflicted on their murderers; or until something at least had been done to satisfy and appease their manes. Are we to suppose that the Romans alone, the contemporaries of Numa, were superior to such prejudices as these? or that the event of this day, May 31, and the seeming instinctive horror and repulsiveness with which the sun appeared to start back from the conjunction of this day, the circumstances of which presented so striking a resemblance to those of the conjunction at the death of Romulus, would not bring his murder home to their consciences; and remind them of the still unexpiated guilt of his blood? It would be absurd to suppose that, whatsoever posterity might be taught to believe concerning the disappearance of Romulus, his contemporaries did not know very well what had become of him; those patricians and senators at least, whose hands had torn him to pieces, and afterwards disposed of his mutilated remains, so as never again to be seen. Numa Pompilius could not be ignorant of the fate of his predecessor; though for political reasons he might choose to dissemble his knowledge of that fact, and even to countenance the popular belief that he had been translated to heaven.

If the Lemuria then were instituted at this time and for these reasons, that fact is very important, both in attestation of the time and the circumstances of the death of Romulus, May 26 B. C. 715, and of the miracle of this day, May 31 B. C. 710, and of the effect which it produced at Rome in the institution of the Lemuria, and in the change of the noctidiurnal rule from sunset to midnight. It is scarcely necessary to observe here, that the solar eclipse at the death of Romulus is the oldest of which any thing is known from contemporary observation and testimony; and this

[a] Cf. Varro, Fragmenta, p. 241.

these circumstances, the Roman rule would be found to have been changed from sunset to sunrise. But the day at this time was nearly fifteen hours of apparent or of mean time in length; and the night was nearly nine: and 4 h. 28 m. 2 s. of mean time after midnight was almost just equal to half the night. This consideration might influence Numa to fix the epoch of the new cycle (supposing it necessary to change it at all, in consequence of the miracle) not to sunrise but to midnight; half way between sunset, its former epoch, and sunrise, the epoch to which it might seem to have been suddenly set back from sunset itself. And if he instituted the Lemuria too, at this very time, and for the rea-

appears to be determined so exactly by the preceding considerations to the time of sunset, May 26 B. C. 715, that an astronomer could scarcely do wrong in assuming that to have been its actual time, (the time of the greatest obscuration at least,) and in calculating it accordingly.

There was another ceremony in the Roman calendar, of which the ancients[u] make mention; but for which they are much at a loss to account. This consisted in throwing figures of men, constructed of withies, bulrushes, wicker-work, *scirpea simulacra*, on a stated day in the month of May from the Pons Sublicius into the Tiber. This stated day was the ides of May, May 15 Roman; only two days later than May 13 the last day of the Lemuria[x]. As we have observed, the fact of this ceremony is very well attested, and its antiquity also; so that it may very probably be supposed to have been an institution of Numa's himself. But the reasons of the ceremony appear to have perplexed even the best informed of the Romans of later times; who were loath to believe, (as this ceremony seemed to imply,) that their forefathers had ever been in the habit of disposing of all, who had attained to the age of sixty, by drowning them in the Tiber. Much of the mystery connected with this custom also is removed, if this too was an institution of Numa's, arising out of the same causes as that of the Lemuria; and intended for the same end and purpose in general, viz. to appease the manes of Romulus. These *scirpea simulacra* would thus really be, what they were always supposed to have been, representatives of the *sexagenarii;* i. e. of those who taken as a body composed the patrician or senatorian order at Rome. These men, or some of these, were in reality the murderers of Romulus: and this was the expedient devised by Numa to offer them to his manes *vicariously;* an expedient quite in character in this instance, with what is recorded of him in other instances also.

[u] Ovid, Fasti, v. 621—662. Dionys. Hal. Ant. Rom. i. 38. Plutarch, Quæstiones Romanæ, lxxxvi. Varro, De Lingua Lat. vi. 90: Fragmenta, 242, 243. Festus, xvii. 504. l. 1 sqq. 13. Sexagenarios de Ponte: i. 26: Argeos.

[x] These figures were 30 in number, Dionys. loc. cit. May 13 Roman the last day of the Lemuria B. C. 710 fell on the 30th Luna.

sons explained in the note; we must perceive at once that the change in all probability would be more for the sake of the services of religion than for any other immediate end and object; and so far would confirm the conclusion to which we have already come[z], that midnight among the Romans, as the epoch of the noctidiurnal cycle, was more properly from the first that of the religious or liturgical, and possibly of the legal or juridical day, than of the common or popular.

Moreover this day, May 31, being the date of the conjunction of the sun and the moon, and well known no doubt to Numa to be so; and the conjunction under ordinary circumstances being a type of marriage; the sun's suddenly going back from west to east on this day, and at a time very near that of the conjunction itself, might be construed into a symptom of aversion on the part of the sun to such a conjunction; and so might give occasion to the prejudice against marrying in the month of May which seems to have existed ever after in the minds of the common people at Rome. It is a curious coincidence that there was a similar prejudice amongst the Arabians also, against marrying in that month of their calendar, which corresponded to the Julian May; though whether it is ultimately to be traced up to the impression produced by the miracle, we do not undertake to decide.

With regard to the change of the Etruscan rule; we are not in possession of data necessary to enable us to say whether the noctidiurnal rule, attributed to them by Servius, viz. that of reckoning from noon, was purely astronomical, or purely civil; was scientific or popular; was their religious rule, or the rule of their common life; was substituted to the primitive rule, or simply associated with it, and ever after coexistent and coordinate with it. Let us suppose however that their rule originally, like that of the Romans down to this point of time, was the primitive. Yet the same or similar reasons, which induced the Romans at this point of time, and in consequence of the anomaly which was now witnessed, to change the epoch of their cycle from sunset to midnight, might influence the Etrurians to change theirs from sunset to noon. The precise date of the miracle, for

[x] Dissertation iv. ch. ii. sect. 13.

their meridian might be about 4h. 30m. of mean time after noon; and that of the restitution, about 4h. 30m. of mean time after midnight; in which case, it might appear to be just as reasonable to fix the new epoch of the cycle to noon, as to midnight. In any case it must be obvious that, if the experience of an anomaly like this in the reckoning of the noctidiurnal cycle in one instance might be considered a reason for looking forward to the possible contingency of something of the same kind again; the epochs of the reckoning, which were the fittest to be adopted in the contemplation of such a possibility, and the least likely to be affected by the recurrence of such an anomaly, would be these two, noon or midnight. The epoch, it might be supposed, would thus be liable to oscillate from noon to midnight, and from midnight to noon; but not be liable to any further degree of change than that. Under the apprehension therefore of the repetition of such an anomaly as that which they had just witnessed, and in order to be prepared for it if it should happen; the Etruscans might fix on noon, as the Romans did on midnight.

SECTION IX. v.—*Change of the rule of Spanish America.*

The corrections of the primitive calendar among the inhabitants of Spanish America, in such cases as we are able at present to ascertain and to fix, appear to have been comparatively of recent date. The Yucatan correction and its date is still of a doubtful nature; but of the Toltec we can speak with confidence, that it came into being in A. D. 700, and not later. The Aztec or Mexican properly so called was derived from this; but 400 years later than it.

This is a class of calendars consequently well calculated to illustrate the continued existence and use of the primitive civil calendar of all mankind from first to last; and therefore to fulfil a very important purpose, not only for the history of that calendar in particular but for the history of mankind in general, and for establishing the fact of a community of origin between the inhabitants of the new world, as it is sometimes called, and those of the old. But the history of this class of calendars is involved in much obscurity, owing to the want of historical data from original and contemporary

sources. We have consequently no precise information, by means of which we might form an opinion in what manner the miracle of B. C. 710 in point of fact affected the rule of the noctidiurnal cycle in this part of the world. Yet we conjecture that it led to a change of the epoch from sunset to midnight, founded on the special reasons of the case. Midnight is certainly one of the epochs of the cycle, discoverable among these nations; as we hope to shew hereafter. When the Spaniards came among the Aztecs in A. D. 1518, they found eight divisions of the noctidiurnal cycle in use among them; each of them equal to a third part of the period of 24 hours in general, though not actually measured by hours, either kairic or mean; for the distinction of the noctidiurnal cycle into hours of any kind does not appear to have been known to these nations. The nature of these divisions however was not such as to fix the epoch of the reckoning to any one more than another. The Araucans of Chili had six of these divisions in their cycle of night and day; and among them the epoch appears to have been midnight. The ceremony of the secular fire among the Aztecs, the oldest, the most solemn, and the most sacred of all in their calendar, seems to imply the same thing of them; for that was always celebrated at midnight: that is, though the ceremony itself began at sunset, the consummation or conclusion, by the lighting anew of the secular fire, took place at midnight. The primitive rule of the cycle then, and a coordinate rule borrowed from midnight, seem both to have been associated in this one ceremony.

We have very little doubt indeed that, were the truth on this subject known, both the ceremony of the secular fire, and this change of the rule of the noctidiurnal cycle, (if it must be so called,) among these nations, would be found to be ultimately due to the miracle of B. C. 710, and to the circumstances under which it took place among them, and to the effect which it produced on their fears and apprehensions. We cannot digress to describe this ceremony at present: though we hope to give an account of it hereafter, if we are permitted to attain to that stage of our work. At present let us briefly consider under what circumstances the miracle would take place among the inhabitants of the new

world; and what was the appearance which it would exhibit there.

The latitude of Mexico is 19° 25′ 45″ N., the longitude 101° 25′ 30″ west of Paris; in time, 6 h. 45 m. 42 s.: and therefore 8 h. 57 m. 7 s. *west* of Jerusalem.

		h.	m.	s.	
Hence at Jerusalem, B. C. 710,	May 31,	18	0	0	mean time;
		−8	57	7	
at Mexico, ...	May 31,	9	2	53	mean time.
		−12	0	0	
Restitution of the sun, ...	May 30,	21	2	53	mean time.

The sun would rise for this latitude, and on this day, about 5 h. 28 m. A. M. apparent time, and set about 6 h. 32 m. P. M. apparent time. It follows on this principle that the miracle began about three hours before noon for this meridian, and was complete about the same length of time before midnight. We cannot indeed assume that the Aztecs were living in Mexico or Anahuac, or were even in existence under that name, so early as B.C. 710. There is enough however, in the coincidence just pointed out, to shew that there must have been meridians, eastward of this of Mexico, at which and for which the miracle would take place *at noon*, and the transition would be instant, and as unexpected as instantaneous, from noon to midnight; that is, from the clearest and most intense degree of the light of day, to the most pitchy and profound darkness of which such meridians and such climates were capable: than which, what could be considered more startling and more astonishing? and what more likely to give occasion to the superstitious dread and apprehension with which the epoch of midnight, for some reason or other, was regarded among these people; especially at such stated times as those of the renewal of the secular fire?

It is to be considered too whether if the Pleiads were preceding the sun at this time, rising and setting and coming to the meridian two or three hours before the sun, for every meridian in its turn, they might not be *on* the meridian for such and such parts of Spanish America when this miracle happened; and known to be so. We recommend this point to the notice of the astronomers. The fact is certain that the culmination of this particular constellation was one of the

phenomena presented by the heavens, to which the Aztecs in particular, for some reason or other, looked with peculiar interest, and attached peculiar importance. It was associated with the ceremony of the secular fire, and apparently from the first; the moment prescribed for the offering of the stated sacrifice, followed by the rekindling of the extinguished fires, (destined to last another secular period of 52 years,) being precisely that when the Pleiads were to be seen in the middle of the sky. What too was so likely to give occasion to a ceremony of this kind, (the extinction of fires of every kind at a stated time,) as the sudden extinction of the light of the sun itself, in the midst of its meridian splendor? or what even to account for the origin of their doctrine concerning the extinction of their four suns at the end of their four ages, one at the end of each, as this miracle too? the effect of which was the apparent extinction of the light of the sun itself at midday*.

* We are not indeed of opinion that the secular fire was instituted B. C. 710, in consequence of the miracle which then happened: for that would imply that the calendar too must have been corrected at that same time; of which there is no proof.

The true date of the earliest correction, among these nations, which appears to have been associated with this ceremony, is March 1 A. D. 700. There is good reason to believe that the correction which then took place, and the institution of the ceremony of the secular fire, (which in all probability took place at the same time,) had an intentional reference to the miracle which happened so long before; and to the striking phenomena at that time exhibited. March 1 A. D. 700 was the first of Thoth. The nature of the correction was such that the calendar, though attached in the first instance to March 1, was allowed to recede on that date as far as Feb. 17, but no further; that is, 13 days in all; a recession generated of course in 52 years. This was the secular period of these nations. At this time (Feb. 17) along with the ceremony of the secular fire, and ushered in by that, 13 days were intercalated; and the calendar was restored to its original Julian date.

Now let the reader observe *this* coincidence; that Feb. 17, the term thus defined by the first principles of the Toltec correction, beyond which the calendar could not pass, but which it must reach before the secular fire could be celebrated, and the intercalation could be applied, was the first of Thoth, B.C. 710, when the miracle took place. The first ceremony of this kind, next after the correction, would take place A. D. 752, just 1461 years after B. C. 710: and then the first of Thoth was again falling on Feb. 17. Does not this imply an intentional reference to the state of things in B. C. 710? In our opinion it does. Such are the secrets which

SECTION X. vi.—*Change of the Chinese rule. On the eclipses of the* Tchun-tsieou *of Confucius.*

The Chinese philosopher Confucius was born in B. C. 551 or 550[z]. A production ascribed to him is still extant, which is allowed to be genuine even in its present state[a]; and in the opinion of the most competent judges, (such as Gaubil and others,) it is as authentic and trustworthy a work as any which is yet known of in the Chinese language.

In this work there is an account of *thirty-six solar eclipses*, all apparently from observation. And these eclipses are very circumstantially characterized: i. By the years of the reigning kings: ii. By the numerical order of the moons in the course of the same lunar year, as the first, the second, the third, and the like: iii. By the place of the same moons in the seasons of the natural year, the spring, the summer, the autumn, and the winter: iv. By the date of the day of the eclipse, in a given instance, in the order of the 60 days' cycle[b]. The first of these characteristics may be something uncertain; partly because these reigns in the *Tchun-tsieou* are not those of the general history of China, but of a part or a province of the empire; partly because none of the reigns, neither those of the general succession, nor much less those of particular and local dynasties, belonging to so remote an epoch as that of the beginning of the *Tchun-tsieou*, in our opinion can ever be determined by the aid of the contemporary history alone. But the other three are much more to be depended on; especially that of the numerical order of

the primitive calendar is calculated to bring to light; and such is the explanation which it furnishes of the reasons and motives of things done so long ago, and in the remotest parts of the world: and such we may add is the testimony which it renders to the most extraordinary matters of fact on record in Scripture.

z See the Traité de la Chronologie Chinoise of Gaubil, edited by Silvestre de Sacy, 4to. 1814, p. 47. 49. 89. 100. 213, 214: Martinius, Historia Sinica, iv. Imp. xxiii. 137: cf. Imp. xxiv. 147.

a We say, "even in its present state;" because the original work did not escape in the general destruction of books, in the 34th year of Tsin-chi-hoang, B. C. 213. See Traité, p. 90: cf. 63, 64. 89.

b We refer for the particulars of these eclipses to the Dissertation of Mons. de Guignes, in the Académie des Inscriptions, xlv. 207. sqq.: to the Traité of Gaubil, in various places; and to his Astronomie Chinoise, in the Lettres Edifiantes, (Paris, 1783.) tome xxvi. p. 71—295: where each of them is considered as it passes under review in its supposed order of time.

the moon in the course of the year, and that of its place in the cycle of 60 days, which we may call the sexagesimal feria of the moon, or of the eclipse in question.

The learned and indefatigable Gaubil, to whose industry and researches the history, the antiquities, and the chronology of China are under such great obligations, having taken it for granted that the lunar calendar of Confucius, or that of the times to which these observations belong, and also the sexagesimal cycle, *mutatis mutandis* merely, were one and the same with the calendar and the cycle of the Chinese of his own day, has attempted to explain and confirm these observations in every instance on that assumption. But the assumption itself was mistaken; and therefore it could not fail to lead him astray.

The truth is that even in the *Tchun-tsieou* the moons which are actually mentioned are repeatedly referred to a calendar which it styles the ROYAL calendar; a designation which the most learned of the Chinese, since the time of Confucius, have never been able to explain; this royal calendar being altogether different from anything of the same kind with which they themselves were acquainted, and (as comparison and collation of one with the other shewed) being incapable of being identified with the traditional and prescriptive lunar calendar of the country down to their own time, except by means of violent and merely conjectural changes in the text of the *Tchun-tsieou*, under the name of corrections of it.

The explanation of this mystery and of this inconsistency is that the royal calendar of Confucius, (whatsoever the reason might be for giving it such a name as that,) was the APIS cycle, the primitive lunar cycle of the primitive solar year. This cycle, as we have already intimated[c], might have existed among mankind and might have been in use from the first; and among the Egyptians in particular we hope to shew in due time that it actually was so. It is sufficient however to observe at present that a particular type of this cycle was beyond all question in use in Egypt, from the epoch of B. C. 973 downwards; and at Babylon too from as far back as B. C. 746. As to China, if it was not previously

[c] Dissertation iii. ch. ii. sect. ii. p. 99.

known and in use there, yet to judge from this testimony of the royal calendar of Confucius, a peculiar form of it must have been introduced and established in that quarter of the country in which Confucius himself was born, viz. the province of *Lou*, (and possibly by royal authority, from which circumstance it might derive its name;) the epoch of which was attached to the second of the primitive Thoth for the time being, Feb. 25, B. C. 742.

This, we affirm, is the royal calendar of Confucius. It is the Apis cycle, as first adapted, and at this time, to the solar and equable calendar, by means of this common term Thoth 2 Nabon. 6, Feb. 25 B. C. 742. All the moons and all the eclipses of the *Tchun-tsieou* are to be reduced to this cycle. And though, owing to the liberties which have been taken with the text of that book, and to a variety of other causes which might be mentioned, the process of this reduction at present is by no means an easy task, and much astronomical skill is necessary for the purpose; we believe that this is the only sure and certain means of restoring the text of the *Tchun-tsieou* to its original integrity, and of recovering from its testimony the authentic dates of each of these eclipses.

With regard to the sexagesimal *feriæ* of these different eclipses; the Chinese have a cycle of 60 years at present, and also one of 60 days; both which are commonly supposed to have existed, and to have been in use, in conjunction among them from time immemorial. Yet Gaubil himself has shewn[d] that the cycle of 60 years was unknown to Confucius; that *this* has not been used by him at least, though he has made constant use of the cycle of 60 days.

The truth on this point too is[e] that the 60 years' cycle, in conjunction with the 60 days' cycle, among the Chinese does not go back in reality further than the date of the modern lunar calendar of China; which, being traced to its epoch through all the changes which it has since undergone, is found to take its rise on February 16, B.C. 657. The annual cycle of 60 is not older than this date, whatsoever the Chinese themselves may pretend to the contrary. The noctidiurnal cycle of 60 *is* older. It goes back *de facto* to the epoch of the

[d] Traité, p. 144. [e] See the introduction to our Tables, part i.

Apis calendar; and it appears to have been introduced for the sake of that calendar itself, and along with it; only that, instead of being attached to the proper lunar epoch of this calendar, Thoth 2, Nabon 6, Feb. 25, B. C. 742, it was actually attached to the first *epagomene*, Nabon 5, Feb. 19, the same year; the reason, in all probability, being that this cycle of 60 days is adapted *a priori* to a year of 360 days, and not to one of 365; and therefore its natural epoch in the equable year might seem to be the first *epagomene*, much more properly than the first of Thoth.

The modern cycle of 60 days in use in China was derived from this older one; but not before B. C. 657. It must have been consequently a mistake on the part of Gaubil to carry this modern cycle back to the beginning of the æra of the *Tchun-tsieou*, which even he himself supposes to be B. C. 722, 65 years prior to B. C. 657. But we cannot enter at present on every explanation which would be necessary fully to clear up this point. Suffice it to say that even in B. C. 657, when the sexagesimal day-cycle of Confucius and the modern one first set out in a state of conjunction of a certain kind, there was still *eight* days difference between them; and the style of one differed from the style of the other to that extent, even from the first.

Now the second eclipse in the list of the *Tchun-tsieou* is described as a *total eclipse* of the sun in *such* a year of *such* a reign; in the *seventh* moon, (which is further defined as one of the moons of *autumn*,) and on the sexagesimal feria called *Gin-tchin*; the numerical order of which is that of the 29th of the cycle. Gaubil has laboured to shew that all these characters meet in July 17, B. C. 709[f]; on which day, for the meridian of *Cai-fong-fou*, or the capital city of the province of *Honan* in China[g], he has calculated a solar eclipse for July 17, 3 h. 5 m. from midnight, (July 17 here being to be understood of July 17 complete at midnight, July 18 ineunte, at the same time). But notwithstanding this coincidence, a lunar ecliptic conjunction, the date of

[f] Lettres Édifiantes, xxvi. 179: also Traité, p. 44. 213.

[g] Traité, p. 185. 245. 264. Lettres Édifiantes, xxvi. 271. Souciet, Observations, Mathématiques, Astronomiques, &c. des Chinois. 1729. tome i. p. 73. x. Delambre, Astronomie Ancienne, i. 364.

which in the cycles of the time being was really derived from the Apis cycle of Feb. 25, B. C. 742, and from the sexagesimal cycle of Feb. 19, B. C. 742, we need not hesitate to say, never could be explained by the lunar calendar of Feb. 16, B. C. 657, and by the sexagesimal cycle of the same date. The truth is, (after what has just been mentioned of the original difference between the two cycles of such different epochs respectively, though of the same denomination,) it must be evident that even if there was a solar eclipse, July 17, for the meridian in question, and in the year in question, it could not have been one characterized in that year and on that day by the *feria gin-tchin* of the sexagesimal cycle.

The year B. C. 709 however, to which Gaubil attaches this eclipse, as far as we have been able to learn, is principally if not exclusively authenticated as he supposes by its coincidence with the eclipse in question—of July 17; and with this sexagesimal feria *gin-tchin*. The grounds of this coincidence being cut away from under it, it has no more claim, as far as any other test or criterion of the truth is concerned, to be considered the year which Confucius intended to specify, than B. C. 710, the year before it. Let us therefore apply the Apis cycle of the time being in China to this latter year; and see what it will indicate.

The first cycle of this denomination, known to Confucius, bearing date Thoth 2, Nabon. 6, the second would bear date Thoth 2, Nabon. 31: and the eighth year of that cycle Paüni 22, Nabon. 37. And whatsoever might be the rule of the alternation of the civil moons in this cycle, whether 29 and 30 days, or 30 days and 29, from the first of these moons to the seventh it would make no difference in any year of the cycle.

Apis cycle, or royal calendar of Confucius.

Cycle ii 8. *Nabon*. 37—38.

	days.			days.	
ist Month,	30.	Paüni 22.	ivth Month,	29.	Thoth 16.
ii. ——	29.	Epiphi 22.	v. ——	30.	Phaophi 15.
iii. ——	30.	Mesore 21.	vi. ——	29.	Athyr 15.

viith Month, 30 days, Chœac 14.

The equable solar calendar, for the latter part of the same year, would stand as follows:

Equable solar calendar of Confucius.

Primitive civil calendar of China.

Thoth 1, Nabon. 38, Feb. 17, B. C. 710, at midn.

1st Month,	Thoth 1.	Feb. 17, midn.
ii. ——	Phaophi 1.	March 19, —
iii. ——	Athyr 1.	April 18, —
iv. ——	Chœac 1.	May 18, —

14 Chœac. May 31, midn.

It thus appears that the date of the seventh lunation, in the style of the Apis calendar of this year, was Chœac 14, answering to May 31: and that this latter was the true Julian date of the second conjunction in May, B. C. 710, we have satisfied ourselves by actual calculation. It might therefore be truly represented in the royal calendar of Confucius as the date of one of the moons of this year, Nabon. 37—38; only under its proper Apis title of Chœac 14, not of May 31.

It will no doubt however be objected to this conclusion, that the *Tchun-tsieou* itself has designated this moon as one of those of autumn. But this objection is just as applicable to the lunar conjunction of July 17; in which Gaubil and the rest of the learned in Chinese chronology would otherwise acquiesce: for this was one of the months of summer. But the true answer to be returned to this objection is, That the distribution of moons among the seasons of the natural year, laid down in the Royal Calendar of Confucius, (that is, in this Apis cycle of China,) was conformed to a purely artificial and positive rule. The reckoning of every year began nominally *in* the spring: and every three months of the calendar were assigned to one of the four seasons of the year, in their nominal order of succession: the first three to the spring, the next three to the summer, the next to the autumn, and the last three to the winter. And though this division as so stated appears to have been an arbitrary one, yet every one must admit that it was quite in accordance with the spirit and genius of such a lunar reckoning as that of the Apis cycle; in which the same moons must necessarily re-

volve through all the seasons of the natural year. And as referred to the epoch of the cycle itself, Feb. 25, B. C. 742, it would be true to nature itself: Feb. 25 being actually the beginning of spring in China, not only at that time but still. It was no doubt considered sufficient that, in the first instance of all, and when this cycle was adopted, this distribution of its moons among the four quarters of the natural year was agreeable to the reason of things, and to the matter of fact; and for a long time after would be so still, *periodically* at least; that is, as often as the cycle returned to its original relations to the natural year; viz. once in 25 equable solar years.

It remains still to consider the sexagesimal character of this conjunction of Chœac 14, Nabon. 38, May 31, B. C. 710.

In the equable year of 365 days the sexagesimal feriæ rise five days every year: and so come round to the same order again in twelve equable years exactly. The 1st of Thoth, Nab. 31, Feb. 19, B. C. 717, was the 11th feria of the cycle: and the 1st of Thoth, Nab. 38, Feb. 17, B. C. 710, was the 46th.

Order of sexagesimal feriæ from Thoth 1 *to Chœac* 14, *Nab.* 38, *from Feb.* 17 *to May* 31, *B. C.* 710.

Nab. 38,	Thoth 1.	B. C. 710, Feb. 17.	Feria 46.
	Add 103.	Add 103.	Add 103.
	Chœac 14.	May 31.	Feria 29.

It thus appears that Chœac 14, the date of the 7th lunation in the 8th year of the current Apis cycle, Nabon. 37—38, among the Chinese, the first of the moons of autumn according to the distribution of moons in the several seasons in that cycle, did actually coincide with the 29th sexagesimal feria for the time being; and that the Julian date, answering to all these characters, and uniting them all in itself, was May 31, B. C. 710; that is, the date of the second miracle of Scripture, the miracle of Hezekiah.

Now this must, in all reason, be pronounced a very extraordinary coincidence; a coincidence much too extraordinary to be resolvable into accident. Not that May 31 Julian, B. C. 710, should coincide with Chœac 14, Nab. 38, and both

with the 29th feria of the sexagesimal cycle of the Chinese for the time being; but that both should be the true date also of the true lunar conjunction, for any meridian in China, the same year; the one in the Julian the other in the Apis reckoning of such conjunctions; and that this lunar conjunction, so expressed and so dated in each, should be noted in the *Tchun-tsieou* of Confucius as the date of a solar eclipse.

It appears, from the tables of Pingrè, that the lunar conjunction in March B. C. 710 was ecliptic. He has an eclipse of the sun that year, for the meridian of Paris, March 4 at 3 A. M.: which for the meridian of Pekin in China would be March 4, 10 h. 36 m. 34 sec. A. M. But he has none for the month of May: nor in fact any other solar eclipse at all that year, except this one in March. We may assume it then as a physical matter of fact, that there could have been no such thing as an eclipse of the sun for any part of China on May 31, B. C. 710. What shall we say then to the testimony of Confucius, that there was an eclipse of the sun on the first day of the first moon of autumn as reckoned by the rule of the royal calendar, on the 29th sexagesimal feria of a year which answers to B. C. 710? and in which all these notes and criteria, (except this one of being also the date of an ecliptic conjunction,) meet in the Julian May 31? In what manner are we to explain the association of the strongest and clearest tokens and tests of truth with a palpable falsehood, and even an impossibility, in one and the same statement, and in one and the same testimony?

The key to the solution is supplied by the miracle of this same day. That miracle would be perceptible in China, as well as every where else; and coinciding as it did with the exact time of a lunar conjunction in that country, (that is, with a time when the sun was *capable* of being eclipsed by the moon,) it is very conceivable that in the course of time it might come to be confounded with an eclipse of the sun; and as such find a place in the list of Confucius, 215 years afterwards*.

* The true date of the miracle, May 31 B.C. 710, was very nearly coincident with the point of time at which the *Tchun-tsieou* itself begins: especially upon the assumption of Gaubil, that its date was B.C. 722.

SECTION XI.—*Change of the rule of the noctidiurnal reckoning in China from sunset to midnight.*

We are now in a better condition to appreciate the nature of the change in the reckoning of the noctidiurnal cycle,

There is a remarkable passage in the Traité[h], which we will quote as it is there given in the third of the notes:

"*Hoay-Nantse* dit que du temps du *Tchun-tsieou,* un prince de *Lou* combattit avec un général du pays de *Han.* Le fort du combat fut au coucher du soleil: alors le prince leva son sabre, et regarda le soleil, comme pour lui donner un signal. Le soleil retrograda de trois *che. Che* exprime en Chinois la quantité du mouvement de la lune pour un jour."

We think it right also to compare with this the same account as it is given in the "Lettres Edifiantes[i]:"

"Avant de finir ces Mémoires sur l'ancienne Astronomie Chinoise, je crois devoir rapporter ce que dit *Hoay-Nantse* sur une rétrogression ancienne du soleil.

Il dit que du temps du *Tchun-tsieou,* un prince du pays de *Lou* combattit avec un général du pays de *Han.* Le fort du combat fut vers le temps du coucher du soleil: alors le prince leva son sabre comme pour donner un signal au soleil. Le soleil retrograda trois *che. Che* exprime le mouvement propre de la lune dans un jour. Ainsi la rétrogression du soleil fut de 39 à 40 degrés Chinois."

The Tchun-tsieou referred to in each of these passages is the work of Confucius so called[k]. Consequently this retrogression of the sun, such as it is here described, was supposed to have come within the period of time embraced by that work: which must do much to connect the retrogression here with the true Scriptural phenomenon of the going back of the sun; at least as the ultimate origin of the tradition.

It appears that *Hoay-Nantse,* from whom Gaubil quotes this account, was a learned and inquisitive Chinese nobleman, who flourished between B.C. 134 and 87. "*Hoay-Nantse,*" he continues in the passage last produced from the *Lettres Édifiantes,* "vivoit du temps de *Outi,* empereur de la dynastie *Han* (B.C. 134–87). *Hoay-Nantse* étoit de la famille Impériale. Il avoit dans son palais beaucoup de savans: il étoit lui-même fort savant, et ramassoit toutes les anciennes traditions et traits historiques: il les faisoit chercher dans les anciens livres dont il fit des recherches avec de grandes dépenses."

Gaubil himself, in his remarks on both these passages, is of opinion that there is a reference in this Chinese tradition to the two miracles of Scripture, that of Joshua and that of Hezekiah. It is evident that there is a reference in it to the latter, but it does not appear that there is any in it to the former. Gaubil thinks too that the knowledge of these miracles

h P. 132, note 3. i Tome xxvi. 243.
k Lettres Édifiantes, xxvi. 245, note 1.

some time or other made in China; and to assign the reason of it.

A superficial acquaintance with the customs, traditions, and institutions of this singular people might lead an inquirer to conclude that the epoch of the noctidiurnal reckoning among them was midnight: and Gaubil himself appears once to have been of that opinion[1]. But the truth is that the epoch is not midnight; it is an hour before midnight; 11 P. M. according to our own mode of reckoning, 23 hours *after* midnight, 1 hour *before* midnight. The entire period of 24 hours is divided by them into 12 equal parts called *tchi* [m], each of them equal to two of our own hours in length. A superficial inquiry also into the apparent antiquity of this rule might lead one to believe that midnight was the oldest and most original epoch of the noctidiurnal cycle, which ever existed or was ever recognised in China; and yet the Chinese themselves trace it up only to the beginning of the dynasty of Tcheou, and to the reign of Vou-vang, the first of that dynasty, B. C. 1122 [n].

Now an epoch of the noctidiurnal cycle and of the period of 24 hours, which is set neither to sunset or to sunrise as variable epochs of the kind, nor to noon or to midnight as fixed and invariable ones, but to an hour before midnight—as every one must allow, is something extraordinary. We can imagine no reason which would be competent to account for it on any of the ordinary principles which may be supposed to have determined such things every where. It must be

was communicated to the Chinese through the Jews; many of whom came into China under the dynasty *Tcnieou*, and were still to be found there in the time of *Hoay-Nantse*. But how absurd to suppose that an event like the recession of the sun, in the time of Hezekiah, could not be known either in China or any where else, except through the Jews! an event which if it really happened would be every where perceived, every where attested and confirmed by the same kind of evidence of its reality. The inference which WE draw from this tradition of *Hoay-Nantse* is, that it was actually observed in China at the time when it happened, and was actually remembered too; so far at least as to be rightly dated sometime within the period embraced by the *Tchun-tsieou*, and more probably near to the beginning of that period than any where else.

[1] Souciet, Observations, tome i. p. 28. 18: 182. iv.

[m] Traité, 243, and Table, p.v. Lettres Édifiantes, xxvi. 134, and Table, p. 288.

[n] Gaubil, Traité, p. 34: 243. Lettres Édifiantes, xxvi. 124, which dates it B. C. 1112.

resolved into something different from usual, some extraordinary reason; and this reason, different from usual, in our opinion is supplied by the miracle of May 31, B. C. 710.

It appears to have been assumed by Gaubil that the meridian of the eclipses recorded in the *Tchun-tsieou* must have been that of *Cai-fong-fou,* metropolis of the province of *Honan* in China [o]: and we must suppose he had good grounds for that assumption. The latitude of this city he fixes to 34° 52′ N.: its longitude to 2° 3′ 15″ west of Pekin [p]. Consequently it was 5 h. 16 m. 56 sec. east of Jerusalem:

	h.	m.	s.	
Hence, at Jerusalem, B.C. 710 May 31,	18	0	0	mean time
	+5	16	56	
At Cai-fong-fou, May 31,	23	16	56	mean time.

That is, the precise time of the miracle for this meridian would be as nearly as possible *one hour* before midnight. The restitution consequently one hour before noon. Sunrise may be assumed for this latitude about 5 A. M. apparent time, 4.50 A. M. mean time; sunset about 7 P. M. apparent time, 6·50 P. M. mean time, exclusive of refraction: and the miracle consequently, 4 h. 26 m. 56 sec. after sunset, would take place soon after the beginning of the sixth hour of night.

We may have something to observe on this coincidence too. At present we remark that the moment of the miracle in mean time for this meridian was very nearly one hour before midnight. Under these circumstances, it would be impossible to continue the reckoning of night, when 11 P. M. suddenly became 11 A. M.; and it might seem to be equally objectionable to substitute the reckoning of day, under such circumstances, for that of night. But it might be an obvious alternative to begin a *new* reckoning, distinct from both, from the date of the interruption itself; or (supposing such a division of the noctidiurnal cycle, as that of the *Tchi,* previously in existence) to call 11 A. M. (the article of the restitution or nearly so) the middle of the 6th *Tchi,* reckoned as from 11 P. M. the night before*.

* To judge from Gaubil's account of the rule of the noctidiurnal cycle in China, one must conclude it was a very uncertain thing; and very dif-

[o] Traité, 185: 245: 264. Souciet, Observations, p. 133, i.: 134. ii.
[p] Ibid. p. 73. x.

ferent at different times. Thus, he tells us, of the reign of *Yu*, successor of *Yao*, and founder of the dynasty *Hia*[q], "Le commencement du jour civil fut vers le lever du soleil, apparemment au lever équinoxial du soleil:" and yet in the calendar of the time of this prince, (the oldest form of the calendar itself, as the Chinese pretended,) the first day of the first moon, it is said, was dated from the evening twilight[r]: and synchronously with the same epoch too, in general, (in the reign of *Yao*,) we are told, the rule was to observe the passage of the stars over the meridian, in the evening, just before sunset[s]: both which statements, in our opinion, are clear intimations that the old rule of the cycle among the Chinese agreed with the primitive; and was well known to have done so at first, whatsoever it might afterwards have become. And yet we are told also that the day was appointed to be reckoned from *noon*, B. C. 1760, by *Tching-tang*, the first of the emperors, after the dynasty Hia[t]: and finally that it was fixed to midnight in the reign of the emperor *Ou-ouang*, (or *Vow-vang*,) the first of the dynasty *Tcheou*, B. C. 1111[u]; to which epoch it continued ever after attached.

The Chinese at present divide the night into five watches, called *Ou-keng*[x], and the period of 24 hours into twelve *Tchi;* each of them consequently equal to two of our hours. Besides this however, they have also a division of the noctidiurnal cycle into 100 parts, called *Ke*[y]: each of them consequently equal to 14'·4 of mean time, or 14 m. 24 sec.: and each of them duly announced and notified to the people in its turn. It cannot be denied that this too is a very singular division; especially as the Chinese have not shewn a preference for the centesimal division in any other instance, as they have for the sexagesimal, and for the division by the number 24. It would have appeared less remarkable, had it been a division of the 24 hours into 96 parts, each of them equal to 15 m. of mean time.

It appears to us that the most probable explanation of this fact also is supplied by the miracle of B. C. 710, and by the peculiar circumstances under which it happened. We have seen that for the meridian of *Cai-fong-fou*, assumed to have been 2° 3' 15" west of Pekin, the precise date of the miracle in mean time was 23 h. 16 m. 56 sec. from midnight. But supposing this meridian to have been really 38' more to the west of Pekin, = 2 m. 32 sec. in time, then the true date of the miracle must have been 23 h. 14 m. 24 sec. for that meridian. Now this would be exactly the 100th part of 24 hours of mean time past the point of the 23rd hour complete. There would be in this fact sufficient foundation on which to build this peculiar division of the whole period itself. We leave others to judge of the probability of the explanation. If true, it supplies the most critical confirmation of the time and of the circumstances of the miracle, first for the meridian of *Cai-fong-fou*, and next for that of Jerusalem, which could

q Lettres Édifiantes, xxvi. p. 88.
r p. 103, 104.
s p. 80.
t p. 112. Cf. 117. 120. 295, note.
u p. 124. 174. 272. 295, note: 221. 234.
x p. 238—240. Cf. Traité, 153. 243.
y Lettres Édifiantes, xxvi. 239. 240.

SECTION XII. *On the Chinese eclipse of* Hi *and* Ho.

No eclipse in ancient history has attracted a greater share of attention, or excited (in modern scholars and chronologers) more interest and curiosity about itself, than the famous solar eclipse of *Hi* and *Ho* among the Chinese[z]; so called after the two royal astronomers of the time being, who neglected to calculate it beforehand, and to announce its approach in due form and manner, so that it came on the king and the people by surprise: for which neglect of their duty, and as a warning to all their successors, these two astronomers were put to death.

In the books of the Chinese the time of this event is set back to a period of indefinite antiquity; and modern astronomers and men of learning, (with too much simplicity, not to say credulity, and too much reliance on the truthfulness and good faith of the Chinese,) have seriously endeavoured to find it in the depths of antiquity, as best they could: none more diligently, more laboriously, more zealously, than father Gaubil[a]. And as the piety of Gaubil, and his sincere belief in the inspiration of Scripture and in the absolute truth of all which he read in his Bible, and in the absolute impossibility that any thing could be true which was inconsistent with that, have never been called in question, we cannot think of suspecting them ourselves. We conclude therefore that he considered it possible to reconcile the seemingly fabulous antiquity of this Chinese eclipse in some manner or other to the truth of Scripture.

Now, B. C. 710, when the sun reappeared in China on the

be imagined. It must be observed however that the times of sunrise and sunset, which we have assumed in all these instances, are only such as may be obtained from a good globe. They have been accurately determined in that manner; but they cannot be considered rigorously true. Were an astronomer to calculate the actual time of sunset on *this day*, for the latitude of *Cai-fong-fou*, taking into account the difference in the obliquity of the ecliptic, the effect of refraction, and every thing else which such a problem would require, it is exceedingly probable that he would find the precise time of the miracle, for that latitude, to be 14 m. 24 sec. of the sixth hour of night.

z Cf. Martinius, ii. Imp. iv. 58.

a Traité, p. 22. 115. note 3: 146. 162. 172. 242 sqq. Lettres Édifiantes, xxvi. 89—94. 277—288.

zenith, May 31, at 11 A. M. it had been more than four hours set: and for the greater part of that time, whether at *Cai-fong-fou* or at Pekin, (or any where else which might be mentioned,) all traces of daylight must long have ceased to be perceived, and it must have been totally dark. What would be thought then in China of so extraordinary a phenomenon as the transition, all in a moment, in less than a second or an instant of time, from a state of profound darkness, when the empire was buried in sleep, to one of noon-day brightness? What could be more surprising? What could excite greater alarm and consternation? Yet what could have been so little foreseen, or so little to be expected? What was more likely then to be visited on the heads of the astronomers, charged by their office with the duty of knowing beforehand, and of announcing beforehand, all the affections of sun and moon whether according to nature or contrary to nature, all the phenomena of the heavens whether ordinary or extraordinary? and yet without any offence or fault of their own.

That this phenomenon should have been taken for an eclipse of the sun, at the time, is scarcely conceivable; that it might come to be so represented in the course of time is very conceivable: especially as it must have been known from the first that it happened on the day of the new moon, and *when* there might have been an eclipse even though *de facto* there was none. And because it was the time of new moon and known to be so even then, it might be connected even then, in the apprehensions or opinions of those who witnessed it, both the king and the people, with the ordinary phenomena of solar eclipses; which the astronomers were bound both to have foreseen and to have foretold. All this, we repeat, is possible: and the whole of this famous tradition of the eclipse of *Hi* and *Ho*, which has given so much trouble to modern scholars, and not less to the learned among the Chinese themselves, is thus most easily, most obviously, and yet most satisfactorily explained and accounted for, by the Scriptural miracle of the time of Hezekiah. A very important conclusion: as proving that there was always a foundation in fact, (and that a *most certain* fact,) for the tradition itself, yet as divesting it of its fabulous and extravagant character; as reducing it within the bounds of reason and

probability; and as leaving it no longer a scandal and a stumblingblock to Christian chronology, but a luminous testimony to the truth of Scripture.

The most ancient authority for the fact of this eclipse, and for that of the traditionary circumstances connected with it, among the Chinese themselves, it is agreed, was the book entitled *Chou-king*. It is also agreed that this book was one of those which perished in the general destruction of historical works and monuments, in B. C. 213 [b]; so completely too that not a vestige of it was recovered, except from memory [c]: and how precarious a source memory alone must be, out of which to regain and restore the text of a lost author, no one requires to be told *.

* In the Lettres Édifiantes [d], Gaubil's account of this eclipse from the *Chou-King* is as follows:

"La première année du regne de *Tchong-Kang* (son of Ki and grandson of Yu, founder of the dynasty Hia [e]) est l'année 2155 avant Jésus Christ. Le chapitre *Yu-Tching* (of the *Chou-King*) rapporte une éclipse de soleil au commencement du regne de *Tchong-Kang*. Dans ce chapitre il est dit que l'éclipse fut vue au premier jour de la troisieme lune d'automne: le texte dit que l'éclipse fut dans *Fang*. Ce texte ajoute que les astronomes *Hi, Ho* (these were the original astronomers of *Yao* himself, who on this principle must have been living and observing 150 years at least [f]) négligerent l'observation de l'éclipse: et qu'au lieu de s'acquitter de leur devoir ils ne pensoient qu'à boire. L'empereur *Tchong-Kang* nomma un Général pour mettre à la raison *Hi, Ho* par la voie des armes."

In the chronicle called *Tchou-Chou* (found as the Chinese pretended in the tomb of a prince of *Ouey*, in the province of Honan, A. D. 279 [g]) a similar occurrence in the reign of this same king was related as follows [h]:

"A' la cinquième année du regne de *Tchong-Kang* en automne à la neuvieme lune au premier jour *Keng-Su* éclipse de soleil. L'Empereur ordonna au prince *Yn* de se mettre à la tête d'une armée pour punir *Hi, Ho*."

One could scarcely suppose there could be any reasonable doubt that this eclipse must have been intended of just the same phenomenon of that kind as the other; yet Gaubil treats them as distinct; fixing the former to October 12, B. C. 2155 [i], and the latter to October 13, B. C. 2128 [k]. Both are supposed to have happened in the reign of the same

b Gaubil, Traité, 57—64. 81. 89. 91. Lettres Édifiantes, xxvi. 236.
c Cf. Delambre, Astronomie Ancienne, i. 350. 352, 353.
d xxvi. 89–101.
e 84–88. Cf. Traité, 18–22.
f p. 74: 84: 103.
g p. 281.
h xxvi. 277–287. Cf. p. 90, note.
i 97. Cf. Traité, 22. note: 243–247.
k xxvi. 277–287. Cf. Traité, 115, note, and 247–249, which seem to recognise two other dates, October 28, B. C. 1948, and October 25, B. C. 2007. Also Lettres Édifiantes, xxvi. p 286.

According to some versions of the *Chou-king*, or to some constructions of its text, the eclipse was dated at 7 or 8 in the morning. But Gaubil has shewn [n] that no time of the day at all was specified for it by the *Chou-king:* simply the fact such as it was: and this appears to have been the case also with a Tatar translation of the Chou-king [o], which is equally silent on that point. And yet it is possible that tradition might perpetuate the actual time of the miracle, that is, of the solar restitution, in terms of the *Tchi*, reckoned from 11 P. M. May 30. In lord Macartney's Embassy to China [p], (though it is not stated from what source the information was obtained,) the eclipse, as witnessed at Pekin, is said to have happened at noon. At Pekin the date of the miracle would be 11 h. 25 m. 9 s. P. M. and that of the restitution 11 h. 25 m. 9 s. A. M. that is, very near noon; sunrise being about 4 h. 45 m. apparent time, independent of refraction, sunset about 7 h. 15 m.

The Chinese tradition dates the eclipse in the constellation *Fang;* which is the name of one of their lunar man-

king; both on the first day of the ninth month [q], (the third month of autumn,) and both to have come on the king and the people by surprise through the negligence of the royal astronomers *Hi* and *Ho*; for which, in both accounts, they are supposed to be punished alike. The *Chou-King* indeed dates one in the first year of *Tchong-Kang*, this other chronicle in the fifth: and on this point they are committed: and one or the other must be in the wrong. We do not see too, if *Hi* and *Ho* were put to death in the first year of *Tchong-Kang*, how they could be still alive in the fifth; or if they were really living in the fifth, how they could have been put to death in the first. In the genuine record of an actual matter of fact, there could be no such inconsistencies as these: in a fictitious account of any kind there might be.

There is a curious description in this part of the Lettres Édifiantes [r] of the ceremonies necessary to be observed in China on occasion of a visible eclipse of the sun; from which an idea may be formed of the alarm and consternation, likely to be produced in that country by the occurrence of an unnotified eclipse, or by the sudden observation of a still more extraordinary phenomenon, like that of the return of the sun from midnight to noon—if either had come upon every one there unprepared for it.

[n] Traité, 242, 243. Lettres Édifiantes, xxvi. 89–101: 254, 255. Cf. Delambre, loco citato.

[o] Delambre, Astronomie Ancienne, i. 353. Cf. Gaubil, Traité, p. 181.

[p] Vol. ii. 557.

[q] Cf. p. 90. The first day of the *Ki-tsieou*, i.e. of the third month of autumn, the ninth in the calendar. Cf. p. 89.

[r] p. 97. Cf. 100, 101: 190.

sions [q], and also of the constellation Scorpio, or of some of the stars in the forehead of Scorpio. We shall see, we trust, hereafter what particular reason they might have for wishing to attach this famous conjunction to that mansion or to that constellation. Some accounts of it however speak of it as *within* Fang; others as *out of* Fang. The words of the *Chou-King*, according to Gaubil, were simply [r], "That the sun and the moon were not in agreement in Fang:" which do not necessarily imply a conjunction at all, (or at least a conjunction under ordinary circumstances,) and not something more like a *disjunction* than a *conjunction*; founded, it might be, on the historical fact that the sun, after being in conjunction with the moon on the day of the miracle, had suddenly started back, and revolted as it were from such an union, and at such a time.

The longitude of Fang, A. D. 1683, was 7 signs, 28°. 31′ [s]. In B.C. 710, 2392 years before that, it would be 6s. 25°. 15′ [t]: which longitude, for the meridian of Pekin, the sun would attain to on October 26 or 27: the true autumnal equinox, for the same meridian, and at the same time, falling October 1, about 10 h. 4 m. 20 sec. apparent time. Fang was therefore at this time one of the nearest constellations to the autumual equinox; and had the calendar, of the epoch of Feb. 16, B. C. 657, been in actual existence in B. C. 710, the new moon would have fallen October 26; *within* the limits of Fang.

The Chinese themselves evidently lean to the hypothesis that the date of this celebrated conjunction was about this time in October, (October 28 [u].) The numerical order of the moon was not specified in the Chou-king, except as the last moon of autumn, and under the designation *Tchin* [x]; which Gaubil shews [x] to be only one of 12 other signs or characters, *tchi*, applied indiscriminately by the Chinese to various cycles or divisions of twelve; the 12 signs of the zodiac, the 12 months of the year, the 12 hours of day and night, the

[q] Traité, p. vi: p. 256, 257. Lettres Édifiantes, xxvi. 77–79: 89.

[r] Traité, p. 242. Lettres Édifiantes, xxvi. p. 98.

[s] Delambre, Astronomie Ancienne, i. 380. Gaubil, p. vi. Lettres Edifiantes, xxvi. p. 288.

[t] Tables, (Supplementary,) table iv.

[u] Traité, 115, note: 247. Lettres Édifiantes, xxvi. 90: 277.

[x] Traité, 243. Cf. 153, and Lettres, xxvi. 251. Table, p. 288.

solar period of 12 years, and each of its parts. According to him [x], it is used in this place of the Chou-king simply in the sense of the conjunction.

The true date of the eclipse, in his opinion, according to this authority, was the first day of the last moon of autumn, the first of the *ninth* month, reckoned from the first of the three months of spring: and this is the moon assigned it in lord Macartney also [y]. October 26, B. C. 710, would have answered to this description, if reckoned from March 4, the new moon before the vernal equinox, B. C. 710. Every thing, in short, conspires to imply that the true origin of this famous traditional eclipse was the miracle of B. C. 710: though the date of the eclipse itself was purposely taken from the calendar of B. C. 657 carried back to B. C. 710. It had been fixed seemingly to the autumn by the testimony of the *Tchun-tsieou;* which consideration, along with other reasons which may appear hereafter, induced the Chinese to place it at the end of October, in the beginning of Fang, rather than any where else.

Lastly; though the lunar observations of the Chinese have been supposed by learned men to extend over a period of 3858 years [z], there is only one lunar eclipse, observed by them, on record [a]; but there is a very long list of solar eclipses, beginning, as it is supposed, B. C. 2159 and continued almost down to the present day [b]. In this respect the ecliptic observations of the Chinese present a singular contrast to those of the Chaldeans; of which the contrary fact holds good, that they were confined exclusively to eclipses of the moon. And yet both appear to have begun to be instituted much about the same time; the Chaldean in B. C. 746, the Chinese in B. C. 742. In the case of the Chaldeans, whether this distinction is to be ascribed to the imperfection of their astronomy, or to some other reason different from that, is a question on which we have no occasion to enter at present. Diodorus tells us of them [c], that they purposely abstained from the calculation of solar eclipses, under an idea that they

[x] Traité, 243. Cf. Lettres, xxvi. 254, 255.
[y] Vol. ii. 557.
[z] Delambre, Astronomie Ancienne, i. 346. liv. ii. ch. i.
[a] Ibid. i. 389.
[b] Ibid. i. 355–357. 386–390.
[c] ii. 31.

were too difficult and too uncertain to be determined; which it is hard to believe of any of the astronomers of antiquity, who, if they did not discover the *saros*, were yet familiar with its use and application. Besides, an opinion of this kind concerning the *calculation* of such eclipses needed not to prevent their observing them as they occurred, and their recording them as they were observed.

But in the case of the Chinese, what is so likely to have produced this distinction as the memorable phenomenon of May 31, B. C. 710, and the fate of the two astronomers *Hi* and *Ho?* That lesson would not be lost on their successors: and its natural effect would be to make them ever after infinitely more careful and solicitous about solar phenomena of every kind, than about lunar. From that time forward, lunar eclipses might be noticed as they occurred, or not; but no one appears to have taken any particular trouble about recording them: whereas every solar phenomenon of the same kind, (as the long list which is exstant demonstrates,) must have been watched for with the greatest vigilance, and have been committed to memory with the greatest punctuality*.

* Since the preceding dissertation was written, we have had an opportunity of learning that from the imperfection of the Lunar Tables of which Gaubil made use, and from the uncertainty with respect to the physical fact of the acceleration of the mean lunar momenta under which astronomy still laboured in his time, a very important error was involved in his calculation of the eclipse of October 12, B. C. 2155, which rendered it impossible that it could have been visible for the meridian and at the time in question. This discovery is due to Mons. Largiteau, a distinguished French astronomer of the present day, who has gone over the same calculations with the solar tables of Delambre and the lunar tables of Damoiseau. See Sédillot, Matériaux pour servir à l'histoire comparée des Sciences Mathématiques chez les Grecs et les Orientaux (Paris, 1849) tome ii. p. 575, who quotes the Journal des Savans, 1840, p. 241. Thus, with regard to this famous eclipse, the astronomers have all their work to do over again; i. e. if they still choose to weave and unweave the same web, to build castles in the air, and to twist a rope of sand, while searching for that which is no where to be found.

DISSERTATION VI.

On the Hebdomadal Cycle.

CHAPTER I.

Preliminary observations.

SECTION I.—*The hebdomadal not a natural division of time.*

THE division of nights and days by cycles of seven nights and seven days perpetually cannot be considered natural in the same sense as the division of time in general by the cycle of night and day in general. This division, and that by the cycle of the month, and that by the cycle of the year, respectively, are natural distinctions of duration; founded on natural motions, and measured and regulated by the natural laws of those motions. But the hebdomadal cycle has not its origin in any motion of nature, different from that the effect of which is the noctidiurnal cycle itself; nor does it derive its proper law from that of the noctidiurnal cycle. The succession of one night and day after another, and that of seven nights and days after each other, are successions of nights and days, it is true; but they are different kinds of that succession; and the law which regulates one of them cannot be the same which directs and rules the other. If the former then is a constitution of nature, the latter cannot be so, in the same sense at least as the former.

The true point of view in which the hebdomadal measurement and reckoning of time is to be regarded, in contradistinction to the noctidiurnal, is that of a particular form of the noctidiurnal; of a modification of the noctidiurnal, posterior to it in the order of the being of both, yet not derived from it; presupposing it indeed, but still superinduced upon it; *positive* consequently in its origin, and referrible to something *ab extra,* and independent of the cycle of night and day itself. There is nothing in the natural revolution of the

earth about its own axis, nothing in the alternation of light and darkness which accompanies it perpetually, to distinguish one numerical revolution, and one individual cycle of that alternation, from another: and if the hebdomadal cycle, merely as consisting of seven such revolutions and of seven such alternations of light and dark, is to be considered natural; the nundinal cycle of ancient Italy, and the sexagesimal cycle of modern China, and every similar division of nights and days, which the history of time brings to light, must be considered natural also.

And yet it is and must be peculiar to this particular modification of the noctidiurnal cycle, that though not actually a natural measure of time, in the same sense as that, it derives its being from the same source as the natural cycle of night and day itself. The antiquity of the hebdomadal cycle, in connection with the present system of things, is just the same as that of the noctidiurnal. The absolute beginning of the one is that of the other also: and in this circumstance of a common origin, and at the same moment of time, and by virtue of the same power and the same authority, there never was any difference between them.

No one however can reflect on the great utility of this division of night and day by periods of sevens perpetually, and not be convinced that if any numerical succession of the noctidiurnal cycle, greater than the cycle itself, was more indispensable than another to the existing order of things, it must be this: if any one was better adapted *a priori* than another both to the moral and to the physical necessities of human nature, it must be this: if any consequently can carry along with it the stamp and seal of a divine appointment for the best and wisest reasons, more distinctly, and more legibly impressed upon it than on any other of the same kind, it must be this.

SECTION II.—*The hebdomadal measure of time necessary to limit the indefiniteness of that of night and day.*

The ultimate element of the distinction and measurement of time in all its forms is the cycle of night and day; but were there nothing besides this cycle to limit, define, and distinguish the succession, it would be too indeterminate to

answer its proper end and purpose. It would exceed the capacity of finite intellects to carry on a succession of this kind, with no help or assistance but the order of the succession itself. In the mere cycle of changes and phenomena, obvious to sense, which accompany the diurnal revolution, there is nothing to distinguish one night and day from another. There is nothing, besides such natural and sensible changes, to distinguish one day from another, except the events, moral or physical, which happen upon them; and these are no parts of the essence of time itself; they are only its accidents and concomitants. And among these events, the number sufficiently important in themselves, and sufficiently distinct from each other, to serve as chronological notes and marks, (boundaries, terminators, *στηρίγματα*, in one and the same course and succession of things,) is ordinarily found to bear no comparison to that of those which are practically unavailing and useless for any such purpose; of which nevertheless the complex of time, in connection with every thing which happens both in the moral and in the natural world, is made up.

The mere cycle of night and day then, by itself, would not be competent to serve as a perpetual measure of duration; at least for the use of men. It would be too indefinite. It would be impossible for a limited understanding to follow it, to comprehend it, or to keep it in mind, in the shape of a constant and invariable succession of nothing but units, differing from one another merely in the order of first and last, but in all other respects the same. To range and distribute the items of such a succession, each in its proper order and proper place; to recollect them, so ranged and distributed, perpetually; to comprehend both the whole and the parts of the succession at all times; to carry on, and to contemplate it, from any point of duration *a parte post* to any point *a parte ante*, without indistinctness, without confusion, without perplexity—is possible for God—but not for man. Who can number the sand of the sea, and the drops of rain, and the days of eternity? asks the wise author of the book of Ecclesiasticus[a]—or *any* part of the sands of the sea, or *any* segment of the days of eternity, which, however finite in com-

[a] Chapter i. 2.

parison of the whole, is capable of approaching to the character of infinite in comparison of ourselves, and of our own comprehension of such distinctions?

Some means then of limiting even the first and simplest of the measures of duration provided for the use of man, but in its own nature the most indefinite of all, was obviously necessary from the first; some means which, without changing the nature of the measure itself, should render it more available for its proper purpose in the hands of such beings as men. The institution of the hebdomadal cycle supplied these means. This cycle is the same kind of measure of duration in general as the noctidiurnal; but it is a more convenient one; a more practicable one; and one more adapted to the comprehension of a finite understanding, than the noctidiurnal. It requires no argument to prove that it must be easier to keep a constant account of duration in periods of seven nights and days at a time, than in cycles of single nights and days perpetually. And in fact, though no actual measure of duration could be dispensed with in such a system and constitution of things as that with which mankind have found themselves connected from the first; yet if the necessity of the case had required it, if the nature of the system itself had allowed of it, if the Author and Disposer of all had seen fit so to ordain it; there is no reason perhaps, why the actual measurement and distinction of the course of duration, for practical purposes, might not have been carried on by means of the noctidiurnal cycle and of the hebdomadal only. The hebdomadal cycle is competent to measure the annual and the menstrual cycle, as well as the noctidiurnal: and this particular cycle among Jews and Christians still, and the nundinal among the Romans of former times, and the sexagesimal cycle among the Chinese at the present day, are practical proofs and illustrations of the fact that the ordinary business of society requires little more than a definite and well understood measure of this kind perpetually; and that history itself, even for the record and preservation of the past, might be independent of any thing else.

SECTION III.—*The hebdomadal cycle necessary as a cycle of Labour, and of Rest from labour.*

Again, though labour of body or labour of mind is the condition of human existence, and always has been so; yet constant and uninterrupted labour of either kind is incompatible with that condition itself, and with both the active and the passive capabilities of human nature. The interposition of an interval of rest from the ordinary employments of life is not only essential to the regular course and continuance of the established order of things, but indispensable to the physical necessities both of the rational and of the irrational part of the creation; not merely to the wants of irrational animals, consigned from the first to the service of mankind, but also to those of the bulk of men themselves every where, whose place in society, howsoever determined and prescribed, independently of themselves, condemns them to incessant toil and fatigue; to the labour of the hands and to the sweat of the brow in some manner or other perpetually.

That the constitution of society then, and the natural exigencies both of men and animals, do require an occasional relaxation of the law of labour, an interval of repose and refreshment from constant exertion and consequent fatigue and weariness, otherwise imposed upon them, no one can doubt. The only question can be, whether this interval is to be regulated in a certain manner, or irregular, precarious, and indefinite? Whether it is better there should be a duly proportioned and a well understood cycle both of labour and of rest from labour, or none at all? which would be impossible: or only at random, and according to no fixed and definite principle? which would be equally objectionable. And if so; what is the legitimate measure of such a cycle? What proportion ought the time set apart for rest and refreshment most reasonably to bear to that which must be devoted to labour and fatigue?

In the calendars of antiquity, (excepting the sacred or Jewish,) it is not easy to find any such regular division of time as the *week:* yet even in these we discover provision enough and more than enough *de facto* for the supply of this natural want of society every where, in their *dies feriati* or holidays of various kinds, during which no serious business

either public or private was commonly transacted; and even no description of labour, properly so called, was permitted. The number of these holidays, in repeated instances, far exceeded any limits which could be considered necessary or reasonable. We are assured on grave and credible authority[b] that, among some of the Grecian communities, in the course of time the number of calendar holidays exceeded the number of days in the calendar itself; and it is in our power to prove that even in the Attic calendar, (most probably by the appointment of Solon himself,) there could not have been fewer than sixty days[c] every year, (a sixth part of the year itself,) which served the same purpose among the Athenians, in breaking the cycle of the ordinary duties and of the ordinary employments of life, as the sabbath among the Jews, or the Lord's day among Christians at present. In the Roman calendar the proportion of *dies nefasti* (which were to all intents and purposes similar intervals of exemption, during which all public and private business of a serious kind was suspended) to *dies fasti*, when the courts of law were open, and the ordinary business of society went on, often became so excessive, (especially in the later periods of Roman history,) that the emperors were obliged to interfere, in order to bring it within more reasonable bounds; as both Augustus, and Claudius, and M. Aurelius at different times are said to have done*.

* The nature of the abstinence from labour, required on the *dies festi*, among the Romans in particular, may be judged of from the allusion to that subject in Virgil:

> Quippe etiam festis quædam exercere diebus
> Fas et jura sinunt: rivos deducere nulla
> Relligio vetuit: segeti prætendere sepem:
> Insidias avibus moliri, incendere vepres,
> Balantumque gregem fluvio mersare salubri.
>
> Georgica, i. 268.

Also from the answer attributed to Mucius Scævola, (a celebrated jurisconsultus of antiquity,) when his opinion was taken on this very point[d]: viz. quod prætermissum noceret. All kind of labour, it seems, and all kinds of work were understood to be prohibited on these days, except

b Strabo, vi. iii. cir. med. of the people of Tarentum. Eustathius, ad Dionys. Perieg. 376. Polybius, xx. iv. cap. vi. § 6. of the Bœotians.

c Hesychius, i. p. 272. Ἀμέρια. Scholia in Aristophanem, ad Vespas, 661.

d Macrobius, Saturnalia, i. xvi. 278.

These indeed are examples of the abuse of the tendency of nature to the gratification of one of its own wants. But they shew what that tendency is, and always has been; and what must be the strength, as well as the universality, of the feeling of the want, in the indulgence of which human nature left to itself has always been disposed to err on the side of excess. Still there must be such a thing as a reasonable degree even of this natural indulgence. Human nature cannot help being conscious of the want; nor consequently craving after the indulgence: and it is entitled to an equitable measure even of the indulgence itself. The only question ought to be, what can this fair and equitable measure of indulgence be? What is that just proportion of labour and toil on the one hand, and of rest from labour and of refreshment after toil on the other, which neither exceeds nor falls short of the physical capacities, or of the physical necessities, both of men and of animals? which neither dispenses too much or too long with the fundamental law of their being condemning them to toil and labour, nor overstrains the severity of this law, and defeats the possibility even of its continued force and operation, by protracting the period of labour without relief beyond the capability of endurance.

This experiment appears to have been tried in France; when after having abolished all other vestiges of their former Christianity the French Directory proceeded to substitute the division of the noctidiurnal cycle into decads, or periods of tens, instead of that by the week or the period of sevens; appointing every tenth day to be a day of relaxation as every seventh had been before: and the experiment was found to fail; for it was discovered on trial, that nine days continued exertion of the faculties both of mind and of body in the same way, and without any interval of remission whatsoever, was more than human nature could sustain[d].

works of urgency and necessity—works which could not be omitted or deferred, without mischief or detriment to something else: and works of necessity (though no doubt much more strictly limited and much more rigorously defined among them than among the Romans) were allowed on the Sabbath even by the Jews.

[d] Alison, iv. p. 682: who, indeed, observes that the labouring population had never been able to establish the exemption from work even on the tenth

The natural cycle then of labour and of rest from labour, of labour of mind or of labour of body, (and it is to this last that the animal creation is universally condemned in the service of man, and the greatest part of men themselves for their own sake and for their own support,) to be followed by an interval of rest, which might render it always practicable, because always endurable; this natural cycle, we say, from the first, (if human nature itself has been the same from the first,) was a cycle of *seven* days; a cycle of six days of toil and fatigue, more or less incessant, and of a seventh day, for repose and refreshment again. For though the experiment may not have been tried in the same way with a cycle of eight, or with a cycle of nine, as with one of ten days; there is little reason to doubt that were the same trial to be made with either of those two, the result would be found to be the same in the end, though possibly not so soon. The active and the passive capabilities of our common nature would as certainly be worn out and exhausted at last by seven days or by eight days continued exertion, as by that of nine.

The natural cycle of labour being one of six days; it follows that the natural cycle of rest, and of refreshment from labour, must be one of seven days. Our common Creator knew this from the first. He himself appointed it to be so from the first; and therefore in his wisdom and in his goodness, for the sake of both his rational and his irrational creatures, he established this cycle from the first: though some among his rational creatures in particular there always have been, and some there are still, who instead of referring such an institution to its proper source, and acknowledging both the goodness and the wisdom which prompted and directed it, have questioned the fact of its divine original; have treated it as an appointment of men for themselves; have discovered it forsooth in the heavens and in the phenomena of the moon, but not in the Bible or in work of creation; have doubted its propriety as an ordinance of divine wisdom and foresight; have disputed its necessity as wanted by man; have denied and disclaimed

day, conceded them by law: and had consequently been condemned to incessant toil and fatigue from the time of the abolition to that of the restoration of the Sunday. He adds however that this restoration was found by them an unspeakable relief.

its right to their gratitude as a provision of the Divine benevolence in behalf of themselves, and of their fellow creatures, and as the fruit of those tender mercies of the universal Creator which have been and still are over all his works*.

* The connection between the hebdomadal cycle and the Mosaic account of the creation is so close, that we cannot be surprised to find that men, who have doubted of the truth of Scripture, have always been anxious to dissolve this connection if possible, and to account for the origin of the hebdomadal division of time among mankind on any hypothesis but that of a divine appointment, founded ostensibly on the length of the interval of the creation. They have consequently sought elsewhere for this natural and spontaneous origination of the cycle, independent of Scripture; and they have discovered it, as they imagine, in the cycle of lunar phases, every where visible and every where the same.

No explanation of the hebdomadal division of time is more generally taken for granted, and more confidently put forward, by writers of a sceptical turn, than this. But it is surprising that even Christian divines and commentators, who have not yet cast off their profession, or renounced their belief in Scripture, should have been weak enough or inconsiderate enough to fall in with this explanation of the sceptic; and, deceived by the mere superficial appearance of probability which it has to recommend it, should have acquiesced in the same hypothesis.

With regard to this explanation itself; the best mode of dealing with those who advance it so confidently is to put them on the proof of the fact. They cannot think it unreasonable that we should call upon them to produce instances of what they assume to be so obvious, and of such common occurrence. Let them find us a cycle of seven days, if they can, either in ancient or in modern times, founded on the lunar phases. We do not hesitate to say that no such cycle is anywhere in existence, nor, as far as anything can be known at present, ever did exist. And it is really extraordinary that men, who have not openly bid adieu to veracity as well as to faith, should persist one after another in affirming *that* to be matter of fact, and *notoriously* matter of fact, which they cannot possibly know to be so from any instance of the fact itself. We repeat the assertion, that go where they will, and search the world all over as they may, they will not find this lunar week anywhere. They may meet with a week of three days, and with a week of eight days, and with a week of thirteen days, borrowed from the moon; but they will nowhere find a week of seven days, derived from the moon, and recognised and observed as a cycle of lunar phases.

And the question between the scriptural account of the origin of the hebdomadal division of time, and the sceptical one, being thus reducible to one of fact, it is superfluous to argue it on any other grounds: or else it would be easy to shew that this lunar cycle of seven days is nothing but a figment of the sceptic himself. It may well have no existence in the practice of mankind, because it has no foundation in nature. It measures

The seventh day in short in the order of the hebdomadal cycle serves the same purpose as the night in that of the noctidiurnal. Both are intervals of rest and refreshment; and necessary intervals too: but the one of daily, the other of weekly, occurrence. Yet mankind might as well attempt to dispense with the night, as the ordinary means of their reinvigoration after the ordinary toils and fatigues of the day, as with the seventh night and day, as the stated and regular interval, prescribed by nature, for the refreshment and renovation of all the actual faculties whether of mind or of body, after all the exertion of six nights and days in succession.

SECTION IV.—*The division of time by the week the ultimate effect of the consecration of the sabbath.*

Whatsoever necessity notwithstanding there might be for some stated and regular alternation of labour and of rest from labour, from the first; and whatsoever reasons, (best known to the Creator of human and of animal nature,) for fixing on this particular measure of the cycle; it is still manifest, as to its immediate origination, that it must be the effect of an appointment; that it was not something which

none of the lunar periods; not even the periodic, much less the synodic. In reality—if the eyes and even the common sense of sceptical writers were not blinded by their prejudices, or if their antipathy to Scripture and Revelation would allow them to deal fairly with any question of fact in which the credit and authority of Holy Writ was concerned; they could not have inquired for a moment into the proper evidences of this question in particular, without having come to the conclusion that if there was a cycle of the lunar phases on which men had everywhere agreed, and about which the *modus loquendi* was unanimous, and men of science and the common people held the same language; it was not this period of seven days, but the other of eight days.

The Nundinal cycle of eight days was based on this assumption in the old world; and the Peruvian cycle of eight days was so in the new. And in reality eight days is fully as exact a measure of the lunar quarters as seven days. Both are in error in comparison of the truth; but the former not much more so in excess than the latter in defect. The true mean standard of the lunar quarter is seven days nine hours, and upwards, of mean time; so that seven days are about as much less than the truth in this respect as eight days are more. First impressions having to choose between these two measures of the lunar quarters, are found to have everywhere fixed on the latter.

the course of the noctidiurnal succession was competent to originate and to establish of itself. The question is only in what manner this effect was brought about, and the noctidiurnal cycle was thus rendered subservient to an ulterior end and purpose, not directly derived from itself.

The reader of Scripture does not require to be reminded that there is no account in the Bible of the institution of the week in the chronological sense of the term, but simply of that of the sabbath; nor yet simply of that of the sabbath in the secondary sense of that word too, but merely of the consecration or sanctification of the seventh day; the particular means of that sanctification being the pronunciation of a particular blessing on that sabbath day, which entailed a particular character of holiness upon it as the consequence of that blessing.

If the week then in reality was instituted from the first, (which cannot be denied,) yet it was so indirectly and consequentially; i. e. by endowing the seventh day (and that the first seventh day of all) with a peculiar character, shared with none of the days which had elapsed before it; a character of peculiar sanctity, derived from a peculiar blessing, pronounced upon this day but on none of those which had preceded it. This distinction could not fail to entail the division and reckoning of the noctidiurnal cycle itself by periods of seven perpetually; at least if the day, so endued with a special character in the first instance, was the seventh in the order of the cycle until then; and if the character, thus specially superinduced in the first instance, was not intended to be confined to this first seventh day, but to be extended to every other seventh in order, and to discriminate by the same special character every seventh day in order, from every six days before it, perpetually.

And with respect to the consecration of this first seventh day, or to the institution of the sabbath properly so called, the account of Holy Writ is *this:* That God rested from the work of creation first *upon* the seventh day; and therefore that he blessed and sanctified the seventh day. He rested from the work of creation *on* the *seventh* day, because the work of creation itself was completed *on* the *sixth* day; and he blessed the seventh day because he rested *upon* it. But

had he rested *on* the sixth day, the blessing attached (for that reason) to the seventh day it is to be presumed would, for the same reason, have been attached to the sixth day.

We see then that according to Scripture itself it was not the seventh day, merely *as* the seventh day, which was blessed at first, but as the *first* of rest after the *last* of labour, (the labour of creation, so to speak without impropriety and without offence.) The blessing pronounced on this day therefore marked and defined not so much the numerical order of the day in the noctidiurnal succession, as the use and purpose to which that order had rendered it subservient; and so much the more significantly, (if we may be allowed such an observation on this entire economy,) if the final end of the blessing, like that of the economy, had it in view, among other things contemplated by it, to prescribe a cycle of labour and of rest from labour, for the creation itself thus brought into being; and to sanction it by the example of the Creator, and by his own part and agency in the work of creation: a cycle of rest to follow a cycle of labour, in the creation and among the creatures thus brought into being: a cycle of rest too which, besides answering that purpose, might serve other uses and purposes, perfectly compatible with that, and even more in unison than that with the special character entailed on it at first by the blessing of sanctification.

In other words, this appointment of the cycle of the seventh day from the first, *because* of rest, (that of the Creator,) and *for the sake* of rest, (that of his creatures,) accompanied with the blessing of sanctification, could not fail to imply the appointment of a sabbath also; a *sabbath* of *rest*, agreeably to the meaning of the word in the Hebrew language, but of *rest unto the Lord*, who had pronounced that blessing upon it; of *rest*, which was destined to exempt it from the ordinary uses of the noctidiurnal cycle, in order to devote it wholly to the Lord, to consecrate it entirely to the duties and services of religion. For that these things are consistent one with the other—rest from the active employments of life, and activity in the duties and offices of religion, which call for no labour or toil of body, nor for any but the most

pleasing and grateful, the most soothing and refreshing occupation of the mind—no reasonable person will deny.

The blessing then, pronounced on the rest of the first seventh day, sanctified the first seventh day. The sanctification of *any* day made a *sabbath* of that day; and such a distinction, bestowed on the first seventh day, became thereby the right of *every* seventh day, the right of the seventh day *as* the seventh day; and not merely of the first seventh day. And this must entail the necessity of a constant observance of the succession of night and day itself by the period of sevens at a time; in other words, of the division of time by the week, and not merely by the night and day; i. e. by the hebdomadal cycle in contradistinction to the noctidiurnal. Nor ought any one to doubt that among other reasons, for which the work of creation was purposely distributed over six days in succession, instead of being completed at once, (some of them discoverable in the process and effect of the creation itself,) the division of time by the week must have been one; that it pleased the Creator first to hallow or consecrate to himself the seventh day by the blessing pronounced on the rest of that day first; and next, through that sanctification of the seventh day, to determine the cycle of the sabbatic seventh perpetually; and eventually through both, and simply as a measure of time, to institute the week.

With regard to the further question in what particular manner the rest of this day may have been observed from the first, or what subsequent traces of its religious estimation are discoverable among mankind; we are not concerned with it at present: though we may possibly have something to say on this subject at a future stage of our work. It belongs to the chronology of the Old Testament, and to the history of the patriarchal dispensation, and of the patriarchal times before and after the deluge. It is sufficient for our present purpose, (which is to explain the origin of the hebdomadal division of time,) that one day was discriminated and set apart from the rest at first, not by any change in its nature as a day, but by superinducing on the common nature of a day in this one, a character to which no day, as a day merely, could have laid claim, more than another; and that too not by arbitrarily determining its place in the order

of the succession of days, but by superinducing upon it, in its natural order and its proper place, a character derivable not from its order and its place in the general succession, but from the use which that order and that place had enabled this one to serve; and by the blessing pronounced on that use.

SECTION V.—*On the substitution of the Lord's day, or Dies Dominica, among Christians, for the primitive sabbath. It has made no difference to the hebdomadal cycle.*

As to the difference which actually exists at present between the Christian rule and the Jewish, affecting the particular question of the observance of one and the same day, both as a day of rest and as a day devoted to the duties and services of religion, and as the seventh day in order in the noctidiurnal succession perpetually; it would not be strictly proper to our business to enter upon that—any more than upon the question to which we have just alluded. We have been inquiring into the origin of the hebdomadal division of time; the essence of which from the first has consisted in the distinction of the constant succession of night and day by periods of seven, after a certain order. This distinction is still kept up. The hebdomadal division of time in that respect is the same at the present day as it was at first. No one can pretend to deny that the hebdomadal cycle of the Christians is the same succession of sevens as that of the Jews. The sabbath of the Jews is the terminator of the Christian week as much as of the Jewish. The religious character and the religious application of the sabbath of the Jews have been transferred to the Dies Dominica of the Christians; but no one can pretend to say that the Lord's day of the Christians is not still, or has not always been, the first day of the very same cycle of seven, of which the Jewish sabbath is still and always has been the last. The original or primitive rule of the cycle is so far attested and authenticated by the rule of Christians at this very day, as much as by the rule of the patriarchs at first, or by the rule of the Jews at any subsequent point of time.

It ought not however to be forgotten that after all "The sabbath was made (took effect or came into being) for the

sake of man, and not man for the sake of the sabbath:" and therefore, if the good or the duty of man so required, if the special reasons of the case so justified the change; the superinduced sanctity, the religious character and obligations, of the seventh day of the cycle might be transferred to the first, leaving the cycle itself the same as before.

It should be remembered that "The Son of Man was Lord (*Master*) even of the sabbath;" so far at least as concerned the assertion of Lordship or Mastership over it, for this particular purpose of the good of man: that is, for the disposing and ordering, in any new way, the details of the cycle in subordination to the observance of any particular day, in the manner best suited from that time forward to the benefit of man, or most consistent with his duty. For though no one can (no one at least ought to) doubt that our Saviour had unlimited power and jurisdiction over the ancient sabbath, and was free to have dealt with it as he might have thought proper; it pleased him, on the occasion to which we are referring [e], to assert his authority over it, subject (as the context shews) to this limitation: and it behoves us to do the same.

It may admit of a question however, whether the religious obligation of the primitive sabbath was ever formally superseded by an act of authority on the part of those who had power to exert such authority. Certainly it was not by our Saviour himself, during his personal ministry. And as to the apostles, there is no evidence on record in the New Testament of the exercise of any such authority by them; there is no appearance discoverable of the relaxation of the old rule in that respect, in favour of any who were previously subject to it. The apostles proceeded with so much prudence and moderation, and with so much tenderness for the habitual prejudices and scruples of their Jewish converts, that unless it could be proved that the obligation of the ancient sabbath was cancelled by the acceptance of Christianity itself; or that Jewish believers in particular might not be excused in the bosom of the Christian church for a conscientious adherence to the oldest and most indispensable rule of their former profession, along with every charac-

[e] Mark ii. 27, 28; Matt. xii. 8; Luke vi. 5.

teristic observance of their new one; we may rest assured it never would be, nor ever could have been, set aside and superseded by an act of authority on the part of the apostles. And yet the fact will hold good just the same; that long before the religious commemoration of the Dies Dominica was established by law over the Roman empire, (whether in the time of Constantine or in that of Leo,) the common consent and practice of the whole Christian world had already invested it with a sacredness of character peculiar to itself; and had already set it apart from the rest of the cycle and dedicated it to uses and purposes proper only for such a character; and therefore, (as it is on every account to be presumed,) by virtue of a sanction derived from the apostles themselves; and agreeably to a tradition and a prescription handed down from the apostolical times; traces of which appear early in the New Testament itself[f].

It will be evident also on reflection, that whatsoever reasons of propriety, derivable from the fact of the creation, and from the relations in which all the moral and responsible creatures of the Divine power were thereby placed to their Maker and Preserver, might require the perpetual observance of the seventh day, before the consummation of the scheme of human redemption, and in particular before the transaction of the two great facts of that scheme, (each of them expressly determined by the Providence of God to the first day of the week, as their most becoming place in the order of the hebdomadal cycle,) the Resurrection, and the effusion of the Holy Ghost; the same reasons, after that consummation, with still greater force and fitness must have prescribed the observance of the first day, as from this time forward the appointed and standing memorial of the still greater fact of redemption, and of the still more cogent and more influential motives to gratitude and acknowledgment, entailed on the moral creation of God by the event of redemption, than even by that of creation. For is any one, who calls himself a Christian, prepared to deny that, great as might be the obligations of Creation, those of Redemption must be still greater? And that a world like our own, created indeed by the power and goodness of God, but lost after its creation

[f] John xx. 19. 26; Acts xx. 7; 1 Cor. xvi. 2; Rev. i. 10.

through its own disobedience, and doomed by his justice to destruction, yet recovered again, and restored to its former state, in so wonderful a manner as by means of the voluntary humanity, the voluntary sufferings, the voluntary sacrifice and death of the Creator himself, is a more glorious display of goodness and condescension, and more calculated to lay an eternal and infinite weight of obligation on the creature, that even their creation itself? Assuredly, if the common and indiscriminate relation of his creatures, before the consummation of this marvellous scheme, laid moral and responsible beings every where under a general obligation to remember and keep holy the *seventh* day; the still closer and more endearing relation of those whom the Creator himself has purchased, and ransomed, and recovered, at the price of his own blood (τῷ ἰδίῳ αἵματι—) lays such moral and responsible beings as Christians in particular under a still stronger, more binding, and more personal obligation to remember and keep holy the *first* day. Nor had the matter of fact turned out otherwise; had it been found by experience that, while the ancient sabbath continued to retain its primitive estimation and its original distinction among the Jews, the ἡμέρα κυριακὴ, the Dies Dominica, the day already designated as the *Lord's*, and already appropriated to his personal right and to his exclusive proprietyship in it, by the great events of the Christian dispensation, was nowhere among Christians acknowledged in that capacity, was nowhere distinguished from the rest of the days of the same cycle, by the professors of his own religion; would those, who have been the loudest to complain of the breach of the fourth commandment, by the substitution of the sanctity of the first day for that of the seventh, have failed to find ground of offence in this very omission; and as we may add, with much greater reason too. The sceptic and infidel of all times could never have wanted a plausible argument against the inward sincerity of that outward profession, which notoriously wanted the seal and confirmation of such an obvious token as this. They do not want any such argument even now; when so many, who call themselves Christians, make so little scruple to deny this day the honour which is its due not for its own sake, but for the sake of the Lord who claims

it; and we do not see how this argument can be answered by those to whom it is applicable, until they amend their practice in this respect, and make it more agreeable both to the reason of things and to their own profession. For both nations and individuals who still call themselves Christians, yet systematically refuse to verify and attest the truth of their profession by a practical proof like this, may rest assured that their profession is nominal; and little better than hypocrisy or self-delusion.

It is evident also that, as a means of defining and limiting the otherwise indefinite and unlimited succession of night and day, the periodical recurrence of the first day answers just as well as that of the seventh. In point of fact however, as we have already observed, one and the same distinction of this course and succession by the period of seven never has been interrupted. The religious character of the seventh day has been transferred to the first; but not the place of the seventh in the order of the cycle. In the alternation of labour and rest too the seventh day is no longer *the* day of rest; but there is still *a* day of rest as much as before; there is a cycle of six days of labour, and of a seventh of rest from labour, the same as ever. The Christian Lord's day is as competent to define this cycle, as the Jewish sabbath; and it does so *de facto* among Christians at least, and has done almost since the first day of the publication of the Gospel itself.

SECTION VI.—*Of the hypothesis that the Christian Lord's day and the primitive sabbath may be the same day.*

There is one mode however of removing the difficulty which this question has occasioned, and one answer which may possibly be returned to the objection from the acknowledged fact of the antiquation of the sabbath among Christians, and the substitution of the Dies Dominica in its stead; which would affect the principles of our own system of time, and therefore ought not to be passed over even in the present work without some notice.

It has been conjectured by Christian divines and commentators on Scripture, that by some means or other the order of the first and that of the seventh day, in the hebdomadal

cycle, before the delivery of the law might have got confounded; that the seventh day, under the Levitical dispensation, might really be the sixth; and the true and perpetual representative of the primitive sabbath after all may be the Dies Dominica. And some there are, who, not content merely to conjecture thus much, do not scruple to say there is reason to believe that this was actually the case.

No hypothesis can be more unfounded; nor can any mode of resolving the doubts and perplexities, (if any there are,) connected with this question, be more objectionable than this. It proceeds on a total misapprehension of the relation of the Levitical sabbath to that of the Creation; as if they could possibly be different things, or could possibly fall on different days of the same hebdomadal cycle: and it annihilates the ulterior reference of both alike to the Christian Lord's day (which is that of the type to the antitype) founded on the relation of the things themselves commemorated by each respectively; of Creation, as commemorated by the one, and of Redemption, as commemorated by the other; for these are related as type and antitype also. The ancient sabbath stood in the same relation to the fact of Creation in which the Dies Dominica stands to that of Redemption; and for this reason alone, if for no other, it must be evident that they could not both be represented by the same day of the same cycle in common. Redemption never could be the same thing with Creation, however much it might resemble it; and if one *feria* of the cycle, by the order of time and by the order of the event, had been already appropriated to the latter, a different one, in due course of time and of events, must be appropriated to the former.

Nor is it possible to draw a distinction between the primitive and patriarchal sabbath and the Mosaic or Levitical one; as if the latter might possibly have been the sixth day of the week, though the former must have been the seventh. Is it remembered, (when such a conjecture as this is advanced,) that the Mosaic sabbath itself, in strictness, was older than the legal? and had been already instituted before the fourth commandment itself had been pronounced? and, as something already entitled to respect and observance by virtue of a prior constitution and injunction of its own, is

significantly recognised in the *first* word of that commandment itself? Is it remembered that the day first pointed out and designated in this capacity of the first Mosaic, or even legal, sabbatic rest, (if it must be so considered,) was so by the finger of God itself; and by the cessation of manna on that morning first, after having been given for six mornings without intermission previously? To suppose a mistake in this first instance of all would be to make the Deity himself the author of it; and even to suppose him to work a miracle expressly to confirm and to perpetuate it: a supposition which it is scarcely possible to state in terms without fear and trembling, much less seriously to entertain.

And should it be imagined that some such confusion might possibly be the consequence of that interruption of the regular order of the noctidiurnal cycle of which we have lately had occasion to say so much; this would prove only that the nature and effect of that interruption must have been very imperfectly understood. The true explanation of that effect, as already given, we trust is sufficient to convince our readers that, instead of any tendency to advance the seventh day into the place of the first, it was more calculated to have drawn back the seventh into the place of the sixth: though in reality the effect produced had no such tendency actually either way.

The joint effect of both the miracles amounted to *this:* Not that *one* revolution of the earth about its own axis, *one* cycle of night and day, *one* period of 24 hours, which if neither of these miracles had happened must have coincided with a certain *feria* in the hebdomadal cycle, by virtue of these miracles and *de facto* came to coincide with a different *feria;* but that *two* periods of 24 hours came to coincide with *one* feria of the hebdomadal cycle. One feria took in not only the 24 hours which it must always have done, but another also. Nor is any proposition more certain than *this:* That the *absolute* order of the noctidiurnal cycle in the hebdomadal cycle has never experienced any interruption, though the *absolute* length of either cycle has not been always the same. It is equally true that every night and day since the Mosaic creation has found its own place in the hebdomadal cycle, just as it must have done under any cir-

cumstances; and that every night and day since the creation has not been actually of the same length: that no actual week, since the beginning of things in connection with human history, has ever contained either more or less than seven actual cycles of night and day; and that every actual week since the beginning, though containing neither more nor less than seven actual cycles of night and day, has not contained the same number of hours of mean time perpetually also.

And as to the conjecture that possibly, if not from the first yet in the course of time, through inadvertency, through a mistaken and inaccurate reckoning of the cycle itself, or from any conceivable reason whatsoever, the sixth day might get into the place of the seventh; it would be altogether precarious and gratuitous. It would be contrary to all analogy, and contradicted by all experience. It would not be more possible or more conceivable of the Jews in former times than of Christians at present. No one could shew when, or how, or where, this confusion of one day of the cycle with another came to be first made; and yet made by a whole nation at once, and in all parts of the world at once; or if made only by a part and not every where at once, how it came to be received and acquiesced in by all and every where at last. To say no more in exposure of the absurdity of such a conjecture as this above all others, it is confuted by the testimony of the hebdomadal cycle itself; which, traced as far back as it may be, is still found to be the same, and to be regulated by the same law, both in the whole of the succession, and in the parts and in the details: the same cycle of seven, (the same measure of duration by the period of seven nights and days, and in the same order,) before the flood, and after the flood; in Canaan, and in Egypt; in the time of Moses and of the Exodus, and under the law: before the captivity, and after the captivity; before the Gospel æra, and subsequently to it: among the Jews at this present day, and among Christians also.

CHAPTER II.

Historical review of the hebdomadal division of time.

SECTION I.—*Antiquity and universality of the division.*

i. IN the Astronomie Chinoise of father Gaubil[g], we meet with the following passage:

"Confucius dans ses commentaires sur les textes de *Ou-en-ouang* et *Tcheou-kong* (the former of these is supposed to have been emperor of China in B. C. 1111) a fait beaucoup d'attention à ce que disent ces deux Princes d'une ancienne révolution de *sept* jours, dont le septième est pour penser à s'examiner et à se corriger. Confucius ajoute à ces textes qu'anciennement les jours des solstices étoient des jours d'une grande fête, qu'on n'exerçoit pas la justice, qu'on ne faisoit pas le commerce; et qu'un septième jour n'étoit employé qu'à examiner ses fautes, à s'en corriger," &c.

There was a similar statement in the classical book *Chou-king:* which we shall quote as we find it in the *Monde Primitif* of Court Gebelin, after the French translation of that work[h]:

"Les annales des Chinois disent 'Les anciens rois au septième jour appellé le *grand jour* faisoient fermer les portes des maisons: on ne faisoit ce jour-là aucun commerce, et les magistrats ne jugeoient aucune affaire.' Elles ajoutent, 'C'étoit-là l'ancien Calendrier.'"

There can be little question that the ancient kings, referred to in this quotation, are *Ou-en-ouang* and *Tcheou-kong* recognised in the passage above produced from Confucius. This extract from the *Chou-king* speaks of this seventh day as something which *had been* devoted to such and such purposes: Confucius' commentary on the texts of the above-named kings supposes them to have spoken of it as something which was still so applied in their time: "Dont le septième *est*

g Lettres Édifiantes, tome xxvi. p. 173, cf. 119.

h Monde Primitif, iv. 81. lib. i. ch. iii. § i. The translation in question was published at Paris in 4to, A. D. 1770. The passage is found at p. cxviii.

pour penser &c. not *étoit*:" which is a very observable distinction; and authorizes the inference that if this seventh day is to be understood of the seventh in the order of the hebdomadal cycle, (which is the most reasonable supposition,) and if this testimony, attributed to these two ancient princes of China, is genuine and can be depended on; not only was the hebdomadal division of time in existence in China in their time, but the religious character of the seventh day, and its distinction from the rest in that respect, was recognised also among them, and in a very remarkable manner.

The Chinese have four or five classical books, at least; that is, books of standard authority, known by the name of Kings: each of which is said to have been revised, arranged, and corrected by Confucius[i]. The above statement or one to the same effect was contained in another of these standard works entitled *Y-king*; from which the Pair Daunou has quoted it[k]; subjoining the following remark: "Voilà dans la Chine antique non seulement une période mais aussi une fête hebdomadaire: et c'est apparemment parceque la fête a été abolie que la période a disparu aussi chez les Chinois, qui depuis plusieurs siècles out cessé de diviser le temps par semaines." This last observation does not appear to us to be well founded; or agreeable to the matter of fact. It is true that the Chinese have long ceased to observe the seventh day as a festival of any kind; but they have all along retained among them the hebdomadal cycle, and in the same order as ever. The name which is given in their language to the cycle of seven days is *Tsi*: and Gaubil observes[l], "Les Chinois surtout dans leurs cérémonies pour les morts usent encore du caractère Tsi (7) pour désigner une semaine. Ils disent un Tsi, 2 Tsi, 3 Tsi, 4 Tsi, &c. pour dire une, 2, 3, 4 semaines," &c. The shape however in which the hebdomadal cycle, according to its proper order, has been perpetually preserved among them, and in which it still exists and still enters the calendar among them, is that of the cycle of 28 days, equivalent to four of our weeks; the same terms of

[i] Lettres Édifiantes, xxvi. p. 171, 172. "Confucius mit en ordre les livres classiques *Y-king, Chou-king, Chi-king, Ly-king*."

[k] Tome iii. leç. ii. p. 74.

[l] Lettres Édifiantes, xxvi. p. 173, note.

which, every seven days asunder, always agree with the same *feriæ* of the hebdomadal cycle. We hope to demonstrate in due time out of what this 28 days' cycle among the Chinese arose; and when it was first introduced, and to what epoch it was originally fixed: the explanation and proof of which things will not leave even the possibility of a doubt concerning its connection with the true hebdomadal cycle from the first.

ii. There is reason to believe that the nundinal cycle of ancient Italy, (the date of which goes as far back as B. C. 1100,) was grafted at first on the hebdomadal. It takes its rise at least, (as we hope to shew in due time,) on the second day of the hebdomadal cycle; and the second day in a cycle of *seven* days every one must allow was the most natural epoch of a cycle of *eight*, supposed to have been derived some time or other from this cycle of *seven.*

iii. It will be demonstrated too, we trust, hereafter, that the hebdomadal cycle must have existed among the Indians, (the ancestors of the Hindus,) in its primitive simplicity, as far back as B. C. 946 at least. It is not necessary to prove that their descendants, the Hindus, have it among them still; and, in every instance too, according to one and the same absolute order of the cycle, and that the same as our own. The epoch or *zero* of the cycle alone is different in different instances; i. e. in some the epoch or zero is the fifth day of the cycle, (our Thursday,) reckoned in this case as the seventh; and the first day of the cycle is Friday: in others the epoch is the seventh day, (our Saturday,) and the first day is the Sunday[m]; which is agreeable to the rule of the cycle from the first. This still continued primitive rule is that of Siam[m], more particularly, and of Japan[n]; and if the Japanese were a colony of the Chinese, (as some have supposed,) it is in all reason to be presumed that they brought their characteristic rule in that respect from the mother country. The other rule, (which reckons the cycle from Friday,) is the more common one at present in India: but

[m] See Bailly, Astronomie Ancienne, ch. iii. § iii. p. 62; Astronomie Indienne, Discours Préliminaire, p. vi: chap. I. § v. 7: § xxvi. 21: chap. ii. § xii. 39: chap. iii. § v. 53.

[n] Cf. Kæmpfer, History of Japan, book i. ch. ii. 41, translated by Scheuchzer, Lond. 1727. Monde Primitif, iv. 81. liv. i. ch. iii. § I. Daunou, iii. Leç. ii. 74.

we hope to have an opportunity of shewing how this rule was first introduced; and when: and that, instead of its being an exception to the fact of the universality of the primitive rule, it is itself a confirmation of it.

iv. With regard to the ancient Egyptians; they were such near neighbours of the people of Israel, and had so constant a communication with them, that, had they known nothing of the hebdomadal cycle from a primitive tradition or usage of that kind, common to them along with the rest of the world, yet every one must consider it morally certain that they must have become acquainted with it through the Jews; and in process of time might very possibly borrow it from the Jews. Nor can any thing, in our opinion, be more unreasonable than the strange incredulity of learned men, which would deny the knowledge or the use of this cycle to the Egyptians above any of the nations of antiquity; the Egyptians, who next to the Jews were the most likely of all to have it among them. But the truth is, (as we trust to be able to demonstrate in due time,) the Egyptians *had* this cycle among them from time immemorial; and a cycle which agreed with the Jewish; and yet was not borrowed from the Jews. The most important change which was ever made in this cycle, (the most striking, the most lasting, and yet the most generally found elsewhere,) was made in Egypt; viz. the imposition of the planetary names on the different *feriæ* of the cycle. We are in a condition to say when this was done, and why; though we are obliged to reserve all particular explanations of that kind for a future time and place.

v. The Persian month, from the time of the correction of the primitive calendar among the Persians in B. C. 702, had four days of greater sanctity than any of the rest; each bearing a name compounded of two elements; one of them the name of the Supreme principle, in the form of Dey; the other that of one of the three chief of the Izeds. These days were the 1st, the 8th, the 15th, and the 22nd in every month. In the ritual of ancient Magianism they answered to the Jewish sabbath; and in the stated services of the modern Parsees they do so still: and though they are not in every instance only seven days asunder, no reasonable person can doubt that this Persian cycle must have been founded originally on the heb-

domadal one. These Persian sabbaths have their prototypes in the Jewish sabbath, or in the primitive sabbath of all antiquity. We have already observed however, that the Persian reformer of the primitive Persian calendar, Gjemschid [o], was not the author of this Magian system, which he adopted and incorporated in his calendar in B. C. 702; but an earlier reformer and legislator, a Bactrian, the first of the two Zoroasters of antiquity. We shall probably see reason hereafter to conclude that the sabbatic cycle of this reformer was taken directly from the hebdomadal.

vi. With regard to the ancient Arabians; it is agreed that they in particular have always had the hebdomadal division of time [p], and long before the existence of Mohammed. The Mahommedan sabbath indeed is the sixth day of the primitive cycle, our Friday, called by them "the day of the assembly." And this observance of the sixth day of the cycle, in that capacity of the day of the assembly, is older also among the Arabians than the time of Mohammed. Yet the date of its introduction and the reason too may very probably be assigned; and that will shew it to have been an innovation on the primitive rule, and yet no exception to it.

vii. Among the ancient Greeks, we have not yet been able to discover any clear traces of the division of time by the week; and the historian Dio [q] has a statement on that point which at first sight appears to be well founded: *Οἱ γοῦν ἀρχαῖοι Ἕλληνες οὐδαμῇ τοῦτο ὅσαγε ἐμὲ εἰδέναι ἠπίσταντο.* And yet we would not venture to say that the investigation of the oldest corrections of the primitive Hellenic calendar, (and especially of the oldest forms of the octaëteris,) may not bring facts to light which nothing will explain but the supposition of an acquaintance with the hebdomadal cycle. The reputed sanctity of the seventh day among the Greeks, (which is so often referred to in illustration of the religious estimation of the number seven, and through that of the primitive tradition of the sabbath as the seventh day in the order of the hebdomadal cycle,) we are entirely of opinion is to be explained on a totally different principle: though what that is must be reserved for the present. If the ancient

[o] Supra, Dissertation v. ch. iv. sect. v. p. 349.

[p] Daunou, iii. leç. ii. p. 73. 75.

[q] xxxvii. 18.

Greeks had any form of the noctidiurnal cycle, greater than unity, peculiar to themselves, it was the cycle of ten days or cycle of nine days (each most probably the same thing, differently expressed); a division of the noctidiurnal cycle founded, no doubt, at bottom on the menstrual, that is, on the length of the month in the primitive solar year, 30 days; into which this cycle of ten days entered thrice. And though this division must have been adapted at first to the primitive solar month, and in fact was perpetually and in reality applicable only to that, it was retained in the lunar calendar of the Greeks; because every month of that calendar, (even those which actually contained only 29 days) was nominally one of 30 days.

viii. We need not investigate the existence of the hebdomadal cycle among the Æthiopians of antiquity, or the modern Abyssinians; who have had it from time immemorial in its integrity and in its simplicity; that is, without a shadow of difference from the hebdomadal cycle of Scripture. It has been found among the Nigri or Negroes in the interior of Africa[r]. In the *Monde Primitif* of Court Gebelin, it is asserted[s] that the week was discovered among the Peruvians; but this is probably to be understood of the cycle of eight or of nine days, (resembling the nundinal cycle of classical antiquity,) which was certainly in existence in Peru both before and at the time of the conquest[t]. We are not aware that clear and indisputable proofs of a primitive cycle like the hebdomadal, or of any similar cycle founded upon that and ultimately derivable from it, have been met with in the new world as it is called; though such proofs may possibly yet come to light. It is however a characteristic of these nations, that they appear to have carried the subdivision of time by the noctidiurnal cycle much further than those of the old world; which is so far an argument that the principle of such a division could have been nothing strange to them, as it is impossible it could have been to any nation of antiquity which had even heard by tradition of the hebdomadal cycle; much less to any which had been using it all along.

[r] Jahn, Archæolog. Bibl. translated by Upham, Andover, U. S. 1832, art. Week, § 102.

[s] iv. 82, liv. i. ch. iii. § i.

[t] Humboldt, Personal Researches, translated by Helen Maria Williams, i. 285.

The Toltecs and Aztecs had a cycle of 4 days, a cycle of 5 days, a cycle of 9 days, and a cycle of 13 days. And this last in particular, which in the Aztec language was called a Tonalli, seems to have been most properly their week. And yet it was peculiar to it to be just the half of their calendar or civil lunar month; the measure of which was assumed by them at 26 days only. The Muysca Indians, a people of Peru, (inhabitants of that part of Spanish America which is now called New Grenada,) had a still smaller cycle of three days, founded on the cycle of lunar phases; ten of which entered into one lunar month of 30 days. And this is the least division of the noctidiurnal cycle, by any number of repetitions of itself greater than unity, and answering in any sense to the idea of a week, which the history of calendars (so far as we know) brings to light.

The greatest division of the same description, on the other hand, with which we are acquainted, is the sexagesimal cycle of the Chinese: a cycle resolvable into the cycle of ten called *Kan*, and the cycle of twelve called *Tchi*, in conjunction. Whether either of these existed separately among the Chinese, before they were thus compounded in the cycle of 60, is a doubtful point. In the opinion of Gaubil [u], the cycle of *ten* did once exist among them, as a cycle of ten days, in a separate state: and this cycle was so obviously capable of being grafted on the primitive solar month, or rather was necessarily so involved in it, that this may very well be supposed to have been the case. It would not be proper to class any such complex of noctidiurnal cycles, as the solar or the lunar month in any form or shape, with cycles of the description which we are considering; viz. *communis generis* with the hebdomadal: though the solar month of primitive antiquity in some calendars meets us in the shape of a noctidiurnal cycle of 20 days, and the lunar month in the shape of one of 15 days, and one of 26 days, and one of 32, and one of 31 days. And under the head of lunar complexes of this kind we may reduce the lunar mansions of antiquity, whether as a cycle of 13 days, or as one of 28 days, or as one of 27 days; the oldest division of the noctidiurnal cycle, next to the hebdomadal, which the history of time

[u] Lettres Édifiantes, xxvi. p. 225: 228, Table of the cycle of 60 days.

brings to light; the first too which men ever made for themselves, and with a view to certain purposes of their own; and as we may add, in the extent of its influence, in the universality of its reception, and in the discoveries which it enables us to make on a variety of the most curious and interesting, yet hitherto most obscure and recondite points, next to the hebdomadal, the most important.

SECTION II.—*On the names of the days of the week, and on the different modes of discriminating them asunder. The Scriptural rule.*

The origin of the hebdomadal division of time itself, and that of the names which have been given to the constituent parts of the hebdomadal cycle, are very different things. The former is a divine institution, as old as the creation of mankind; and possibly even older: the latter are something of human invention; and, like every thing else, which has been left to men themselves, they were liable to be determined and imposed on various principles and in various manners, without in the slightest degree calling in question the divine origin of the cycle at first, independently of all human concurrence.

We have seen reason however to conclude that neither the months in the primitive calendar, nor the days in the primitive hebdomadal cycle, were discriminated asunder by any names but those of number. There are no traces in the Bible of any such thing as proper names for the days of the week. If they are mentioned and designated there at all, it is by their numerical place in the order of the cycle. The practice of the Jews in this respect illustrates the rule of Scripture. The Jews may adopt the popular names of the days of the week, wheresoever they happen to be living; but when they speak of them advisedly, they discriminate them only by their number and order. The hebdomadal nomenclature of their books and of their calendar is still the primitive one of Scripture.

The idiom of Scripture however, and that of the ancient Hebrew, in this respect is so far peculiar, that it makes use of the cardinal instead of the ordinal numbers to distinguish the succession of the cycle. The first day of the week is called

one of the week, the second *two* of the week, and so on. This idiom appears first in Genesis i. 5: "And there was evening and there was morning, *one* day:" instead of, the *first* day. It appears in the New Testament in the account of the transactions on the morning of the resurrection [x]; and in the Acts of the Apostles [y]; and in the Epistles of St. Paul [z]. "Apud Hebræos," observes Isidore [a], dies prima una sabbati dicitur:" and Bede and others make the same remark. And this is still the style of the Syrians, whether Christians or Jews; as appears from the Syrian laterculus of the days of the week, which Dr. Hales [b] has extracted from Marsh's Michaëlis.

The seventh day of course among the Jews had always a name peculiar to itself, whether σάββατον or σάββατα; and whether with or without the article. And besides this, in the course of time the sixth day, as devoted to the business of preparing for and ushering in the sabbath, (so much of it at least as was appropriated to that purpose, viz. from the ninth hour to sunset,) as we collect both from Josephus [c], and from the Gospels [d], had acquired the name of παρασκευή; and at the epoch of the Gospel æra was familiarly known by that appellation.

SECTION III.—*On the planetary names of the days of the week.*

"Dies dicti a diis, quorum nomina Romani quibusdam sideribus sacraverunt. primum enim diem a sole adpellaverunt, qui princeps est omnium siderum, sicut et idem dies caput est cunctorum. secundum a luna, quæ soli et splendore et magnitudine proxima est, et ex eo mutuat lumen. tertium a stella Martis, quæ Vesper vocatur. quartum a stella Mercurii, quam quidam candidum circulum vocant. quintum a stella Jovis, quam Phaëthontem dicunt. sextum a Veneris stella, quam Luciferum adserunt, quia inter omnia sidera plus lucis habet. septimum a stella Saturni, quæ

x Matt. xxviii. 1: Mark xvi. 2. cf. 9: Luke xxiv. 1: John xx. 1.

y xx. 7.

z 1 Cor. xvi. 2.

a Origines, v. 30. p. 40. D.

b Analysis, i. 119. Cf. Marsh's Michaëlis, i. 136.

c Ant. xvi. vi. 2.

d Mark xvi. 42: Luke xxiii. 54: John xix. 31: Matt. xxvii. 62.

sexto cœlo locata xxx annis fertur explere cursum suum [e]—. Apud Hebræos autem dies prima una sabbati dicitur, quæ apud nos dies Dominicus est, quem gentiles soli dedicaverunt. secunda sabbati secunda feria, quem sæculares diem lunæ vocant. tertia sabbati tertia feria, quem illi diem Martis vocant. quarta sabbati quarta feria, qui Mercurii dies dicitur a paganis. quinta sabbati quinta feria est, id est quintus a die Dominica, qui apud gentiles Jovis vocatur. sexta sabbati sexta feria est, quæ apud eosdem paganos Veneris nuncupatur. sabbatum autem septimus a Dominico die est, quem gentiles Saturno dedicaverunt, et Saturni nominaverunt. sabbatum autem ex Hebræo in Latinum *requies* interpretatur [f].

Speaking of these names and for these days, as received into general use in his own time, (A. D. 229,) the historian Dio [g] gives us a double account of their origin; one derivable from the principles of harmonic proportion, the other from the Egyptian astrology; and determined in the following manner.

Each of the twelve hours of day and of the twelve of night being supposed to be dedicated to some one of the seven planets, (including the sun and the moon,) in the following order, beginning with Saturn; Saturn, Jupiter, Mars, Sol, Venus, Mercury, Luna—*κατὰ τὴν τάξιν τῶν κύκλων*, as Dio observes [g], *καθ' ἣν οἱ Αἰγύπτιοι αὐτοὺς νομίζουσιν* [h]: the first hour of the first day, (which in this scheme coincided with the 7th in the order of the primitive cycle,) was assigned *extra ordinem* to Saturn; who consequently gave name to the first day, as the day of Saturn. The 22d hour of this day (1 + 21 or three cycles of 7) would again fall to Saturn, and the 23d again to Jupiter, the 24th again to Mars. This first day would terminate with the 24th hour. The first hour of the next day would therefore fall to Sol, or the Sun; who consequently gave his name to that day as the day of the Sun: and so on, in the same kind of cycle of seven, circulating among the 24 hours of the noctidiurnal

[e] Isidore, Origines, v. 30. 40. C. Cf. De Natura Rerum, iii. 247. Also, Ausonius, Eclogarium, 372. De Nominibus septem dierum, 1–11.

[f] Origines, v. 30. 40. D.

[g] xxxvii. 18, 19.

[h] Cf. Servius ad Georgica, i. 33. Æneid. ii. 255: vi. 127.

period; which if any one will follow perpetually, he will find to bring out the first hour of the third day under the regency of Luna; the first of the fourth under that of Mars; the first of the fifth under that of Mercury; the first of the sixth under that of Jupiter; and the first of the seventh, (with which the cycle expired only to be renewed and proceed again in the same way,) under that of Venus.

These same planetary names, and for the same days of the hebdomadal cycle, are capable also of being derived (though after a different manner) from the scheme of planetary Trigona; which those who are curious about it may see explained in Scaliger's work, De Emendatione [i] But the true and historical account of the way in which they were first obtained and were first imposed, in our opinion, is that which we have just given: and as to the quarter where and the time when it was first done and in this manner, we have proofs to produce, which we hope will leave no doubt that it was first done by the Egyptians in B. C. 798. Herodotus [k] tells us that the Egyptians were the first to appropriate particular days of the month to particular gods; and while they were engaged in doing that, it would be only part of the same process, and of the same system, to assign each of the hours of these days also to its proper presiding and tutelary influence.

The above at least is the explanation of the connection between the stars and the days of the week and the hours of the day, which was most generally received among the ancients. "Præterea cum videamus octavo quoque die ejusdem sideris horam primam aut quamlibet denique esse; ut cujus hodie fuerit hora prima, ejusdem octavo quoque futuram [l]." It is the explanation recognised and taken for granted, as Mr. Ideler observes [m], by an Egyptian astrologer Paulus Alexandrinus, no doubt after his predecessors in that science—for he himself is comparatively modern: his work being dated by himself on Wednesday Mecheir 20, Diocletiani 94, answering to Feb. 14, A. D. 378, which was a Wednesday [n]. It is very observable however that this planetary

i Lib. i. 8. C.

k ii. 82.

l Hyginus, Astronom. Poet. iv. cap. ii.

m Technical Chronology, Egyptian calendar.

n Cf. Fabricius, Bibliotheca Græca, tom. ii. lib. iii. cap. xx. § ix. 503–505. 504.

cycle of the Egyptians set out with Saturn and with the seventh day of the primitive cycle; which both recognises that cycle, and yet shews that this Egyptian one was independent of it, though grafted upon it.

These planetary names appear in Clemens Alexandrinus, a Christian father, but an Egyptian Greek: Οἶδεν αὐτὸς καὶ τῆς νηστείας τὰ αἰνίγματα, τῶν ἡμερῶν τούτων τῆς τετράδος καὶ τῆς παρασκευῆς λέγω· ἐπιφημίζονται γὰρ ἡ μὲν Ἑρμοῦ ἡ δὲ Ἀφροδίτης[o]. They would be recognised also by a much older testimony; if the fragment could be considered genuine which Porphyry[p] attributes to Ostanes, a celebrated magician of antiquity, a disciple of Zoroaster's, and the reputed author of the Octateuchus.

> *Κλητίζειν Ἑρμῆν ἠδ' Ἠέλιον κατὰ ταῦτα*
> *ἡμέρῃ Ἠελίου· Μήνην δ' ὅτε τῆσδε παρείη*
> *ἡμέρη, ἠδὲ Κρόνον ἠδ' ἑξείης Ἀφροδίτην,*
> *κλήσεσιν ἀφθέγκτοις*[q]*, ἃς εὗρε μάγων ὄχ' ἄριστος*
> *τῆς ἑπταφθόγγου βασιλεύς, ὃν πάντες ἴσασιν.*
> *Ὀστάνην λέγεις, εἰπόντων· ἐπήγαγεν·*
> *Καὶ σφόδρα, καὶ καθ' ἕκαστον ἀεὶ θεὸν ἑπτακίφωνον.*

The coincidence between the day sacred to Saturn in this planetary cycle, and the Jewish sabbath, gave occasion to a very general opinion among the ancients, that the Jewish sabbath also was from the first dedicated to Saturn.

> Aut ego sum caussatus aves aut omina dira
> Saturni aut sacram me tenuisse diem.—Tibullus, I. iii. 17.

Septimo die otium placuisse ferunt; quia is finem laborum tulerit. (vide cap. 3.) dein blandiente inertia se-

[o] Strom. vii. xii. § 75. p. 263. l. 32.

[p] Apud Euseb. Præp. Evang. v. 14. § 1. 428. E Porphyrio, *περὶ τῆς ἐκ λογίων φιλοσοφίας.* Cf. also i. 10. § 53. p. 93. Of Osthanes or Ostanes, see Diogenes Laertius, Prooemium, §. ii. 2. Pliny, H. N. xxx. 2. 460, 461. There was a double Ostanes, one a contemporary of Xerxes, who accompanied him to Greece, B. C. 480, and who is said to have been the instructor of Democritus: (Cf. Diogenes Laërtius, lib. ix. cap. vii. § ii. 34, Democritus:) the other, a contemporary of Alexander the Great, and "comitatu ejus exornatus:" Pliny, H. N. xxx. 2. 464. Cf. also Tatian, Oratio ad Græcos, xxviii. 63, 64.

[q] These *κλήσεις ἄφθεγκτοι* were prayers, half articulate half inarticulate, as the Magi were taught to pronounce them in addressing the objects of their worship: mussitationes or mumblings. Cf. Pausanias, v. xxvii. §. 2, 3.

> Hic divos testatus avos Chaldæus in extis
> Pontificum de more senex *arcana* peregit
> *Murmura.*
> Sidonius Apoll. Carmen ii. 85.

There is a specimen of this mode of praying in Lucian, Opp. i. 465. Necyomantia, 7. l. 56–65.

ptimum quoque annum ignaviæ datum. alii honorem eum Saturno haberi, seu...... seu quod e septem sideribus ... altissimo orbe et præcipua potentia stella Saturni feratur[r]. — *Καὶ τὴν ἡμέραν τὴν τοῦ Κρόνου καλουμένην ἀνέθεσαν (αὐτῷ)*[s].

The connection between the planets and the days of the week having thus been established in Egypt and in this order in B. C. 798, the same planetary and hebdomadal cycle passed into China, into India, into Arabia, and into almost all parts of the east; just in the same order too, and at times which admit of being determined. If Philostratus' Life of Apollonius could be quoted as trustworthy testimony to any matter of fact, Apollonius found it in India, in the reign of Claudius or of Nero[t]: *Φησὶ δὲ ὁ Δάμις καὶ δακτύλους ἑπτὰ τὸν Ἰάρχαν τῷ Ἀπολλωνίῳ δοῦναι, τῶν ἑπτὰ ἐπωνύμους ἀστέρων, οὓς φορεῖν τὸν Ἀπολλώνιον κατὰ ἕνα, πρὸς τὰ ὀνόματα τῶν ἡμερῶν*: though, as to the existence of this cycle in India under these names and at this very time, we want no such equivocal testimony as that of this Life of Apollonius.

Philastrius enumerated the use of the planetary names of the week by Christians among Christian heresies[u]; and Fabricius mentions[x] a serious proposal of a Spanish writer (Campanella) to give the names of the seven sacraments of the Romish church to the days of the week in their stead; and the names of the twelve apostles to the twelve months of the calendar instead of those which they derive from the Julian correction; a suggestion, he tells us, actually adopted in the Fasti Sacri of Ambrosius Novidius Fraccus, dedicated to Pope Paul III., and accompanied with a description in elegiac verse, in imitation of the Fasti of Ovid. But all this is matter of pure indifference. The early Christians entertained no superfluous scruples of this kind. They made no difficulty about retaining the names both of the days of the week and of the months of the calendar, to which they had been accustomed before their conversion; merely substituting, (as often as the necessity of the case required them to do so,) for the sun's day, or Sunday, the name of the

r Tacitus, Hist. v. 4.

s Dio Cassius, xxxvii. 17.

t Vita, iii. xiii. 148. A. Cf. Lydus De Mensibus, ii. 3. p. 14. l. 9–11. p. 27. l. 6.

u Cap. cxi.

x Bibl. Græca, tom. iv. cap. xiv. p. 460.

Lord's day, the ἡμέρα κυριακὴ—the *dies Dominicus* or *Dominica.*

Καὶ τῇ τοῦ ἡλίου λεγομένῃ ἡμέρᾳ πάντων κατὰ πόλεις ἢ ἄγρους μενόντων ἐπὶ τὸ αὐτὸ συνέλευσις γίνεται, καὶ τὰ ἀπομνημονεύματα τῶν ἀποστόλων ἢ τὰ συγγράμματα τῶν προφητῶν ἀναγινώσκεται μέχρις ἐγχωρεῖ[y].—Τῇ δὲ τοῦ ἡλίου ἡμέρᾳ κοινῇ πάντες τὴν συνέλευσιν ποιούμεθα, ἐπειδὴ πρώτη ἐστὶν ἡμέρα, ἐν ᾗ ὁ Θεὸς τὸ σκότος καὶ τὴν ὕλην τρέψας κόσμον ἐποίησε, καὶ Ἰησοῦς Χριστὸς ὁ ἡμέτερος σωτὴρ τῇ αὐτῇ ἡμέρᾳ ἐκ νεκρῶν ἀνέστη. τῇ γὰρ πρὸ τῆς κρονικῆς ἐσταύρωσαν αὐτὸν καὶ τῇ μετὰ τὴν κρονικὴν, ἥτις ἐστὶν ἡλίου ἡμέρα, φανεὶς τοῖς ἀποστόλοις αὐτοῦ καὶ μαθηταῖς ἐδίδαξε ταῦτα[z].—Si diem solis lætitiæ indulgemus, alia longe ratione quam de religione solis, secundo loco ab eis sumus qui diem Saturni otio et victui decernunt, exorbitantes et ipsi a Judaïco more quem ignorant[a]."—Alii plane humanius solem Christianum deum æstimant, quod innotuerit ad orientis partem facere nos precationem, vel die solis lætitiam curare. quid vos minus facitis? non plerique affectatione adorandi aliquando etiam cœlestia ad solis initium labra vibratis? vos certe estis qui etiam in laterculum septem dierum solem recepistis, et ex diebus ipsum prælegistis quo die lavacrum subtrahatis, aut in vesperam differatis, aut otium et prandium curetis. quod quidem facitis exorbitantes et ipsi a vestris ad alienas religiones. Judæi enim festi sabbata et cœna pura, et Judaïci ritus lucernarum et jejunia cum azymis et orationes litorales, quæ utique aliena sunt a diis vestris. quare, ut ab excessu revertar, qui solem et diem ejus nobis exprobratis agnoscite vanitatem. non longe a Saturno et sabbatis vestris sumus[b].

SECTION IV.—*On the chronological and ecclesiastical designation of the names of the days of the cycle.*

When ecclesiastical writers have occasion to allude to the days of the week by name, they generally speak of them in the style of *feriæ;* calling the first day the *feria prima,* the second the *feria secunda,* and so on: and chronologers

[y] Justin Martyr, Apologia Prima, Opp. 97. l. 20.

[z] Opp. 98. 21. Cf. Dialogus, p. 221. 1–7. 222. 16 sqq. 430. 9–18.

[a] Tertullian, Apologeticus adversus Gentes, 16. Opp. v. 45.

[b] Adv. Nationes, i. 13. Opp. v. 154.

also commonly make use of the same idiomatic way of speaking of them.

Bede would seem to refer the introduction of this peculiar idiom to Sylvester, bishop of Rome[c]; but Sylvester, even according to the Catalogus Pontificum Romanorum[d], was pope only between January 31, A. D. 314, (Coss. Volusiano et Anniano,) and January 1, A. D. 335, (Coss. Constantio et Albino.) Yet it appears from the Computus Paschalis ascribed to Cyprian, of the date of A. D. 243, that this was the usual style of ecclesiastical chronology even then in speaking of the days of the week; and still earlier (at least not later) the same idiom occurs in Tertullian[e]: Proinde nec stationum, quæ et ipsæ suos quidem dies habeant quartæ feriæ et sextæ.

The learned are much divided in opinion respecting the origin of this idiom, and the grounds or reasons of the application of this term *feria* to the parts of the hebdomadal cycle. Isidore derives it *a fando*[f]: A fando autem feriæ nuncupatæ sunt; quod in eis nobis sit tempus dictionis; id est in divino vel humano officio fari. sed ex iis festi dies hominum causa instituti sunt, feriati causa divinorum sacrorum. Again[g]: Hebdomada apud Græcos et Romanos septem dierum cursu peragitur .... hebdomada autem septem feriis constat. feria quoque a fando dicta quasi *fari,* (faria): eo quod in creatione mundi per singulos dies dixit Deus *Fiat.* item quia dies sabbathi ab initio feriatus habetur, inde dies solis prima feria nuncupatur, quia primus est a feria. Bede too inclines to this explanation of Isidore's; but he adds another, as we have already observed, on the authority of pope Sylvester, which would be much more to the purpose: Prima feria ..., id est prima dies a feria, ut Isidorus dicit. secundum Sylvestrem Papam, prima feria dicitur quasi prima dies[h].

Julius Pollux, (author of a Chronicon not much later than

[c] De Divisionibus Temporum, i. 123.

[d] Apud Bucherium, De Doctrina Temp. 273. Sylvester was bishop when the Arian controversy arose in the church: see Theodoret, i. iii. 8. A. (Valesii:) yet not at the time of the council of Nice: see Eusebius, Vita Const. iii. 7. 487. A. Socrates, i. viii. 19. B. Sozomen, i. xvii. 430. A: (cf. i. ii. 403. A. (A. D. 324); ii. xxx. 470. C.) But there is a good deal of confusion in the succession of bishops at Rome about this time—Sylvester, Marcus, Julius.

[e] Opp. ii. 391, 392. Adversus Psychicos, 2.

[f] Origines, v. 30: 40. E.

[g] De Natura Rerum, iii. 247. C.

[h] De Divisionibus Temporum, i. 123.

the time of Constantine, which has come down to posterity,) mentions a law or constitution of that emperor's, which was as follows[i]: *Τρίτον νόμον ἔγραψεν ἀπράκτους εἶναι τὰς δύο τῆς πασχαλίας ἑβδομάδας, καὶ πρὸ μίαν καὶ μετὰ, τὴν δὲ παρασκευὴν καὶ τὴν κυριακὴν τιμᾶσθαι προσέταξεν, τὴν μὲν διὰ τὸν σταυρὸν τοῦ Κυρίου τὴν δὲ διὰ τὴν ἀνάστασιν.* A similar constitution is attributed to the emperor Valentinian the younger; which ordained that the seven days before Easter and the seven days after should be kept as holidays, (dies feriati.) This being supposed; and the ecclesiastical year of the early Christians being assumed to have begun at Easter, and the first fourteen days of this year, (or the last seven of one and the first seven of the next,) to have thus been appointed to be reckoned and observed as *feriæ;* Scaliger grounds on this fact an opinion that the name of *feriæ* came to be extended from that coincidence to the days of the week in general[k]: and other learned men have explained the application of this term to them on the same principle. The opinions of Scaliger are entitled to much deference and respect; but in this instance he could not have sufficiently recollected that the word *feria* had been already appropriated to the days of the week in the time of Tertullian and of Cyprian: more than 100 years before the reign of Constantine, and much more before that of Valentinian the younger.

Mr. Ideler has conjectured that the name of *feriæ* was first given to the *fourth* and to the *sixth* days of the cycle; and that too because they were kept as holidays: and that afterwards by degrees the term was transferred to the rest. But in strictness these two days were not kept as holidays, but as fast days[l]; and the observance of them even as fast days was borrowed by the Christians in the first instance from the Jews[m].

If we may be allowed an opinion on this subject, we should explain this mode of speaking of the days of the week, (as characteristic of the idiom of Christian chronology,) by

i Pag. 266. (Hardt, Lipsiæ, 1792.)

k De Emendatione, i. 6. C. Cf. vii. 775. D. 776. B.

l Cf. Clemens Alex. Strom. vii. xii. § 75. p. 263, 264. Apostolicæ Constitt. v. 15. PP. Apostolici, 255. C: vii. 23. 309. B.

m Apostolicæ Constitt. vii. 23. 309. B. Philostorgius, x. xii. 526. Codex Pseudepigraphus, (Fabricii, tom. ii.) Josephi Hypomnesticon, lib. v. cxlv. cxlvi. 332, 333. Also our Dissertations, xviii. vol. ii. 140.

the influence of two facts, neither of which can be called in question: i. That the first day of the hebdomadal cycle, as the Lord's day, was a stated day from the first for the assembling together (σύναξις or συνέλευσις) of the Christians both in the towns and in the country, in order to the celebration of the offices of religion in common; as appears indeed from the testimony of Justin Martyr, produced above[n]: ii. That this first day of the week as the Lord's day, and as such a stated day of assembly among Christians, from the first was an *holiday*, in the strictest and most proper sense, a day of rejoicing, a day of gladness, as well as of religious worship: which fact too is fully established by the testimony of Tertullian quoted *supra*[o].

Now a day which united these two characters answered to the proper notion of a *feria* or *dies feriatus;* whensoever it might fall out. The classical sense of *feriæ* is that of *holy days,* whether with or without a stated calendar date. The Latin grammarians acknowledge the distinction of *feriæ cum festo,* and *feriæ sine festo;* and as an instance of the latter they refer to the *nundinæ,* or nundinal days of the Roman calendar, which were *feriæ,* whensoever they happened to come round, and on whatsoever day of the month they happened to fall; but feriæ attached to no fixed and permanent calendar date.

In like manner the ἡμέρα κυριακὴ, the dies Dominica or Lord's day, on whatsoever day of the month it happened to fall, made a *feria* of it. The *first* day of the week, under such circumstances, could not fail to be regarded and spoken of as a *feria:* and as it was the first day in the order of the cycle, it would be spoken of as the *feria primæ* (*diei*) or *feria prima:* and this designation having once come to

[n] Page 418. Add to this the well known passage of Pliny the younger, Epp. x. xcvii., concerning the practice of the Christians of Bithynia in his time: Quod essent soliti *stato die* ante lucem convenire: which almost all commentators are agreed to understand of the first day of the week. This is consequently the oldest testimony extant to the already acknowledged religious character and estimation of the first day of the week, after that of Rev. i. 10. The date of this Epistle of Pliny was U. C. 863, A. D. 110.

[o] Page 418. Compare also the Theophania of Eusebius, lately translated from the Syriac by Professor Lee of Cambridge: lib. iii. 36. p. 173: "That they should make a *feast* in holiness both of the *body* and of the *soul* on the day of every week which is called among the Greeks the sun's day."

Hence, no doubt, that rule of ecclesiastical discipline, that Sunday was never to be kept as a fast—not even in Lent, or in Passion week itself.

be applied to the first day of the week, that of the *feria secunda* would soon come to be applied to the second almost as matter of course; that of *feria tertia* to the third; and so on.

This mode of speaking of the hebdomadal cycle, and of its component parts, we may consequently conclude, very probably took its rise in that part of the church in which not only the Latin language, but the nundinal cycle also, was still familiar and in use; that is at Rome or in Italy.

SECTION V.—*On the Anglo-Saxon names of the days of the week.*

It is not our intention to enter at present on the consideration of the names given to the days of the week in the calendars of the north of Europe; except very briefly, and in the single instance of the Anglo-Saxon calendar, from which the names of these days of which we ourselves in this country make use are derived. And in illustration of these Anglo-Saxon appellations, we shall be content to refer to Verstegan; and merely to give the substance of what he has said on the same subject[q].

The word *day* in the Anglo-Saxon is deag or deagh. The first day of the week, being dedicated to the sun, was called *Sun's deagh.* The second, being dedicated to the moon, was called *Moon's deagh.* The third, being consecrated to Tuisco, or Tuysco, (the son of Hertha, or Earth, and the father of Mannus, or Man, according to Tacitus,) was denominated *Tuisco's deagh, Tuis deagh,* or Tuesday. The fourth, as sacred to Woden, was termed *Woden's deagh,* (Wodnes deagh,) or Wednesday. The fifth was appropriated to Thor, and styled *Thor's deagh.* It bore also the name of *Thunre's deagh*, or Thunder's deagh. But whether Thor, or Thunre, or Thunder's deagh, it is the original of our Thursday. The sixth derived its name from Friga, or Frea: *Friga's deagh,* or *Frea's deagh;* our Friday. The seventh was called *Seater's deagh,* Sater deagh, or Saterday; from Seater or Sater, another idol so called.

We make no comment on any of these designations at present; except so far as to observe that such appellations

[q] Restitution of Decayed Intelligence, 68—80. Cf. p. 10.

themselves demonstrate that they are older than the conversion of the Anglo-Saxons to Christianity. They must have been imposed by them on the days of their week while they were still idolaters. There are however only two among them which agree with the planetary names of the Egyptian cycle; viz. Sunday and Monday: and these being the first and the second in the Anglo-Saxon scheme, and the second and the third in the Egyptian, there is no reason to suppose the former were borrowed from the latter. The Anglo-Saxon calendar was originally solar, as much as any other of antiquity; and it agreed at first absolutely with the primitive solar calendar: but when the nation embraced Christianity it was lunar, and had been so for nearly a thousand years. They were very likely to have reasons of their own for giving the names of the sun and of the moon respectively to the first and second days of their hebdomadal cycle. It has been conjectured by writers of great authority, that the use of this cycle among the nations of the north was not indigenous to them, but borrowed from the Romans. We know of no good reason for that conjecture; but rather, and on the contrary, we have seen every reason to conclude that the nations of the north of Europe were acquainted with this cycle long before they had any onnection with the Romans: and in all probability by virtue of a primitive tradition, and of an uninterrupted primitive use and prescription, in this instance, among them as much as among any of the rest of mankind. But these are questions which must necessarily be reserved for future consideration.

SECTION VI.—*On the idiomatic use of σάββατον, σάββατα, ἑβδομάς, and the like.*

No one perhaps requires to be told that the word *sabbath* in our language is derived from the Hebrew: but many probably may have forgotten that the meaning of the word in that language is simply *rest*. It is only secondarily that it denotes a certain day of the hebdomadal cycle. Ἡμέρα σαββάτου or ἡ ἡμέρα τοῦ σαββάτου, in the sense of *a day of rest*, or of *the day of rest*, is a legitimate association of ideas; but not so, in the sense of *a seventh* day, or of *the seventh* day. And as used in this proper sense of *rest*, the name of the

sabbath is just as applicable to the first day of the cycle as to the seventh.

It appears from Josephus[r] that Apio, (a writer of some repute among the Greeks and Romans, but utterly unworthy of credit where any object was to be attained by calumniating and disparaging the Jews,) made his readers believe that the Jewish word *σάββατον* was derived from the Egyptian *σαββὼ*, or *σαββάτωσις*: terms which in that language denoted a sore of some kind, *τὸ βουβῶνος ἄλγος*, as he explained it. He was not ignorant of the falsehood of this representation; but he chose to dissemble, and even to belie, the truth: and it was scarcely worth the while of Josephus to refute and expose so palpable a calumny: Τὸ *γὰρ σαββὼ καὶ σάββατον πλεῖστον ἀλλήλων διαφέρει. τὸ μὲν γὰρ σάββατον κατὰ τὴν Ἰουδαίων διάλεκτον ἀνάπαυσίς ἐστιν ἀπὸ παντὸς ἔργου, τὸ δὲ σαββὼ, καθάπερ ἐκεῖνός φησι, δηλοῖ παρ' Αἰγυπτίοις τὸ βουβῶνος ἄλγος.*

The first Greek writer who seems to have explained this word, for the better understanding of the Greeks, agreeably to its true meaning in Hebrew, (the first at least of whom we know any thing of this kind at present,) was Aristobulus the contemporary of Ptolemy Philometor[s], and his reputed master or preceptor, quoted by Clemens Alexandrinus[t] as Aristobulus the Peripatetic philosopher; though he was a Jew of the dispersion, and very probably of Alexandria in Egypt, like Philo Judæus in after times: *Ἐχομένως δ' ἐστὶν ὡς ὁ θεὸς τὸν ὅλον κόσμον κατεσκεύακε καὶ δέδωκεν ἀνάπαυσιν ἡμῖν, διὰ τὸ κακόπαθον εἶναι πᾶσι τὴν βιοτὴν, τὴν ἑβδόμην ἡμέραν*[u]. Josephus proposes the same explanation, when he has first occasion to mention the sabbath; which of course is in the account of the creation[w]: *Ὅθεν καὶ ἡμεῖς σχολὴν ἀπὸ τῶν πόνων κατὰ ταύτην ἄγομεν τὴν ἡμέραν, προσαγορεύοντες αὐτὴν σάββατα· δηλοῖ δὲ ἀνάπαυσιν κατὰ τὴν Ἑβραίων διάλεκτον τὸ ὄνομα.* It is similarly explained by Philo Judæus[x]: *Ἑπόμενος δ' αὐτὸς αὐτῷ καὶ τὴν ἑβδόμην, ἣν Ἑβραῖοι σάββατα*

r Contra Apion. ii. 2.

s Cf. Eusebius Præp. Evang. vii. 13. § 7. 184; 14. § 1. 185: viii. 8. § 56. 279; 9. § 38. 291; 19. § 17. 296. Cf. 2 Maccabees i. 10.

t Ibid. ix. 6. § 6. p. 356: xiii. 12. § 1. p. 310. Cf. our Dissertations: Diss. vii. vol. i. 318. and the note in loc.

u xiii. 12. § 9. 315.

w Ant. Jud. i. i. 1.

x Opp. ii. 5. l. 30. De Abraham.

καλοῦσιν, ἀνάπαυσιν ὀνομάζει. And when the true meaning of the word, and the reason alleged by the Jews for the observance of the *rest* of this day, came to be generally known among the Gentiles; both the name and the reason of the name were turned by them to the prejudice of the Jews; and were made grounds of ridicule or of reproach.

> Radix stultitiæ: cui frigida sabbata cordi:
> Sed cor frigidius relligione sua est.
> Septima quæque dies turpi damnata veterno,
> Tamquam lassati mollis imago Dei.
>
> Claudius Rutilius Numatianus, Itinerarium, 389.

A reproach which came with a very bad grace from one whose calendar was charged to repletion with these days of sloth and idleness: these *feriæ stultorum*, and worse than *stultorum feriæ*. Yet even Seneca could fall into the same inconsistency of condemning the practice of the Jews, in thus sacrificing one day, as he supposed, and applying it to no useful purpose; though the Roman calendar in his own time was notoriously overloaded with days just as liable to the charge of being mispent or misapplied. Reprehendit (Seneca) sacramenta Judæorum et maxime sabbatha, inutiliter eos facere adfirmans quod per illos singulos septem interpositos dies septimam fere partem ætatis suæ perdant vacando [y].

It cannot be questioned however that the word *σάββατον*, or *σάββατα*, is commonly explained by the Jews themselves to mean, even in their own language, the seventh day. Τὴν γὰρ ἑβδόμην ἡμέραν σάββατα καλοῦμεν [z]—Κατὰ δὲ ἑβδόμην ἡμέραν ἥτις σάββατα καλεῖται [a] κ', τ. λ. Hence it is that Josephus repeatedly styles the sabbath *τὴν ἑβδόμην ἡμέραν*, or *τὴν ἑβδομάδα*, or *τὰς ἑβδομάδας ἡμέρας*, without any qualification. Ὁ δὲ τέταρτος παρατηρεῖν τὰς ἑβδομάδας [b]—Καὶ ταῖς ἑβδομάσιν ἔργων ἐφάπτεσθαι [c]—Τῆς δὲ ἐπιούσης ἡμέρας ἑβδομάδος οὔσης [d]—Μεταξὺ δὲ τὴν ἑβδόμην ἑορτάζοντας [e]—Μηδὲ τῆς ἀργῆς ἑβδομάδος ἔννοιαν λαβόντες [f]—Δεῖν μέντοι τὴν ἡμέραν αὐτὸν ἐκείνην . . .

[y] Augustin, De Civitate Dei, vi. 11.
[z] Josephus, Ant. Jud. iii. vi. 6. Cf. x. 7.
[a] Ibid. iii. x. 1.
[b] Ibid. iii. v. 5.
[c] Bell. Jud. ii. viii. 9: De Essæis. Cf. Eusebius, Præp. Evang. ix. 3. § 18. p. 349: Porphyry, De Abstinentia, iv. 11. 331—13. 343.
[d] Ibid. ii. xiv. 5.
[e] Ibid. vii. viii. 7. p. 1114. Cf. ii. xvii. 10: xviii. 1.
[f] Ibid. ii. xix. 2.

ἑβδομὰς γὰρ ἦν[g]—*Ὁμοίως ταῖς ἑβδομάσιν ἡμέραις*[h]—*Εἰ μὴ τὰς ἑβδομάδας ἐπιτηρῶν*[i]—*Ὡς ἐν ταῖς ἐν ἑβδομάσιν ἡμέραις*[k]—*Ἀργεῖν τὰς ἑβδομάδας ἡμέρας*[l]—*Ἑκάστην ἑβδομάδα εἰσιοῦσαν προεσήμαινε*[m]—*Ταῖς δ' ἑβδομάσι καὶ νουμηνίαις*[n]—*Ἀργεῖν τὴν ἑβδόμην οὐκ ἐπιτρέπων . . καταλυθῆναι τὴν ἑβδομάδα*[o]—*Τῆς παρὰ τοῖς Ἰουδαίοις ἑβδομάδος τὴν τιμὴν ἐμφανίζοντες*[p]—*Ἀλλ' ἑκάστης ἑβδομάδος τῶν ἄλλων ἔργων ἀφεμένους*[q]—*Ἔνθα μὴ τὸ τῆς ἑβδομάδος ἦν ἀργοῦμεν ἡμεῖς*[r].

The same idiom appears in Philo Judæus: *Ἐπεὶ δ' ὁ σύμπας κόσμος ἐτελειώθη κατὰ τὴν ἑξάδος ἀριθμοῦ τελείαν φύσιν, τὴν ἐπιοῦσαν ἡμέραν ἑβδόμην ἐσέμνυνεν ὁ πατήρ*[s]—*Μὴ γὰρ ὅτι ἡ ἑβδόμη*[t]—*Τίς γὰρ τὴν ἱερὰν ἐκείνην ἑβδόμην οὐκ ἐκτετίμηκεν*[u]—*Τὴν ἱερὰν ἑβδόμην ἐσέμνυνεν*[v]—*Ἀφ' οὗ καὶ εἰσέτι νῦν φιλοσοφοῦσι ταῖς ἑβδόμαις Ἰουδαῖοι*[x]—*Περὶ τοῦ τὴν ἱερὰν ἑβδόμην ἄγειν ἱεροπρεπῶς*[y]—*Αἱ δὲ ταῖς ἑβδόμαις*[z]—*Ἑξῆς δ' ἔστι κεφάλαιον τὸ περὶ τῆς ἱερᾶς ἑβδομάδος*[a]—*Ἀναπέπταται γοῦν ταῖς ἑβδόμαις*[b]—*Ἵνα τὴν ἑβδομάδα τιμήσῃ*[c]—*Δευτέρα δ' ἡ δι' ἓξ ἡμερῶν ἑβδόμη, σάββατον αὐτὴν Ἑβραῖοι πατρίῳ γλώττῃ καλοῦσι*[d]—*Ἑβδόμη τε γὰρ πᾶσα ἡμέρα ἱερὰ, τὸ καλούμενον παρ' Ἑβραίοις σάββατον*[c]—*Ἣν ἑορτὴν τὴν μεγίστην Μωσῆς ἀνεῖπεν, πατρίῳ γλώττῃ σάββατον σαββάτων ὀνομάσας, ὡς δ' ἂν Ἕλληνες εἴποιεν ἑβδομάδες ἑβδομάδων*[e].

It is not surprising therefore, that out of Judæa the seventh day and the sabbath in the course of time should have come to mean the same thing. Itaque Moses, Damascena antiqua patria (§ 1.) repetita, montem Synam occupat: quo septem dierum jejunio per deserta Arabiæ cum populo suo fatigatus cum tandem venisset; septimum diem, more gentis

g Bell. Jud. iv. ii. 3.
h i. ii. 4.
i Ibid. i. vii. 3.
k Ant. Jud. xiii. viii. 1.
l Ibid. xiv. iv. 2.
m Bell. Jud. iv. ix. 12.
n Ibid. v. v. 7.
o Ibid. vii. iii. 3.
p Ibid. vii. v. 5.
q Contra Apion. ii. 17.
r ii. 39. Cf. i. 22: Ant. Jud. iii. xii. 3: xvi. ii. 4.
s Opp. i. 21. l. 31. De Mundi Opificio.
t Ib. i. 450. 30. De Migratione Abrahami. Cf. ii. 113. 45–114. 5. De Mose, i: 175. 34–176. 27. De Mose, iii.
u Ib. ii. 137. 38. De Mose, ii.
v Ib. 166. 34. De Mose, iii.
x Ib. 168. 3. De Mose, iii.
y Ib. 188, 189. De Decem oraculis. Cf. 197. 3. ibid.; ii. 281. 14. 289. 35. De Septenario: 569. 17. De Virtutibus.
z Ibid. 239. 4. De Animalibus sacrificio idoneis.
a Ibid. 277. 1. De Septenario.
b Ibid. 282. 13. Cf. 458. 14—23. Quod liber quisquis virtuti studet: 476. 8–21. De Vita Contemplativa: 568. 32, De Virtutibus.
c Ibid. 286. 21. De Septenario et Festis diebus.
d Ibid. 278. 17.
e Ibid. 296. 15.

sabbatum adpellatum, in omne ævum jejunio sacravit[f]. Ἔτι μὴν καὶ περὶ τῆς ἑβδόμης ἡμέρας, ἣν πάντες μὲν ἄνθρωποι ὀνομάζουσιν, οἱ δὲ πλείους ἀγνοοῦσιν ὅτι παρ' Ἑβραίοις ὃ καλεῖται σάββατον Ἑλληνιστὶ ἑρμηνεύεται ἑβδομάς· ἥτις εἰς πᾶν γένος ἀνθρώπων ὀνομάζεται μὲν, δι' ἣν δὲ αἰτίαν καλοῦσιν αὐτὴν οὐκ ἐπίστανται[g].

There is no distinction to be drawn, in the usage of Jewish writers, between *σάββατον* and *σάββατα*, each meant of the sabbath; nor as with or as without the Greek article respectively: Ἣν Ἑβραῖοι σάββατα καλοῦσιν[h]—Σάββατον αὐτὴν Ἑβραῖοι... καλοῦσιν[i]—Τὸ καλούμενον παρ' Ἑβραίοις σάββατον[k]—Σάββατον σαββάτων ὀνομάσας[l]—Ἐν τῷ καλουμένῳ ὑφ' ἡμῶν σαββάτῳ[m]—Κατὰ δὲ ἑβδόμην ἡμέραν, ἥτις σάββατα καλεῖται[n]—Τῇ πρὸ τοῦ σαββάτου· τῷ δὲ σαββάτῳ[o]—Καὶ τοῖς σαββάτοις, καὶ ταῖς λοιπαῖς ἡμέραις[p]—Κατά τε τὴν τῶν καλουμένων σαββάτων ἡμέραν[q]—Ἀπὸ σαββάτου ἐπὶ σάββατον[r]—Ἡ τῆς ἐν τοῖς σαββάτοις παρανομίας[s]—Εἰσελθὼν γὰρ σαββάτοις εἰς τὴν πόλιν[t]—Τὴν ...λεγομένην σαββάτων ἡμέραν[u]—Συμβάλλουσιν αὐτοῖς εἰς μάχην σαββάτων ἡμέρᾳ[x]—Μηδ' ἐν κακοῖς παραβῆναι τὴν τοῦ σαββάτου τιμήν[x]—Τὰ δὲ σάββατα καὶ ἑορτὴ ἅπασα[y]—Οὔτε ἐν τοῖς σάββασιν οὔτε ἐν ἑορτῇ[z]—Κατ' ἐκείνας τὰς ἡμέρας ἃς δὴ σάββατα καλοῦμεν[a].

In the New Testament, the word *σάββατον* or *σάββατα* is used also for the whole of the week, as well as for the sabbath day: Νηστεύω δὶς τοῦ σαββάτου[b]—Ὀψὲ δὲ σαββάτων, τῇ ἐπιφωσκούσῃ εἰς μίαν σαββάτων[c]—Ἀναστὰς δὲ πρωῒ πρώτῃ σαββάτου[d]—Κατὰ μίαν σαββάτων[e]. In other respects there is no difference between the idiom of the New Testament in the use of this word, and that of Josephus. This enlarge-

[f] Justin. lib. xxxvi. cap. ii. § 14.
[g] Theophilus ad Autolycum, ii. cap. xvii.
[h] Philo Judæus, ii. 5. l. 31. De Abrahamo.
[i] Ibid. ii. 278. 17. De Septenario et Festis.
[k] Ibid. 286. 25.
[l] Ibid. 296. 18.
[m] Josephus, Ant. Jud. iii. vi. 6.
[n] Ibid. iii. x. 1.
[o] x. 7.
[p] xii. 6.
[q] vii. xii. 3.
[r] vii. xiv. 7.
[s] xi. viii. 7.
[t] xii. i. 1.
[u] xii. v. 5. Cf. xiii. i. 3: xiv. x. 25.
[x] xii. vi. 2.
[y] xiii. ii. 3.
[z] xiii. viii. 4.
[a] xiii. iv. 3. Cf. xii. 4: xiv. 10. 20. 21. 23. 25: xvi. vi. 4: xviii. ix. 2. Bell. i. vii. 3: ii. xvii. 10: xix. 2. Vita, 32. 53. 54.
[b] Luke xviii. 12.
[c] Matt. xxviii. 1. Cf. Mark xvi. 2; Luke xxiv. 1; John xx. 1. 19; Acts xx. 7.
[d] Mark xvi. 9.
[e] 1 Cor. xvi. 2.

ment of the meaning of sabbata seems to have been extended from the week even to the month:

Hodie tricesima sabbata[f]:

unless *tricesima sabbata* stands here for the *new moon,* which at this period of their history was kept by the Jews with something like the strictness of the sabbath itself; and might fall on the 30th of the month.

Ecclesiastical writers in the Latin language, as we have seen, style the days of the week *Feriæ:* feria prima, secunda, &c. The Greek fathers designate them by their order, *πρώτη, δευτέρα, κ`, τ. λ.* The fourth day is called by them *τετράς.* Philo Judæus, as we have seen, in one instance applies the term *ἑκτὰς* to the sixth; but it occurs, we believe, in that sense nowhere else. The seventh of course is *ἑβδομὰς,* or *ἑπτάς.* The proper name of the first day however, in the Christian style, among the Greeks was *ἡ κυριακὴ,* or *ἡ ἀναστάσιμος ἡμέρα*; in Latin, *Dies Dominica* or *Dominicus;* that of the sixth *παρασκευὴ* or *ἡ παρασκευὴ, Parasceue;* that of the seventh *σάββατον* or *σάββατα, sabbatum.* All these may be seen in the Apostolical Constitutions: *Δευτέρα σαββάτων*[g]—*Ἐν τῇ ἡμέρᾳ τοῦ σαββάτου καὶ ἐν τῇ τοῦ Κυρίου ἀναστασίμῳ, τῇ κυριακῇ*[h]—*Ἐν τῇ κυριακῇ*[i]—*Ἀρχομένη μὲν ἀπὸ δευτέρας πληρουμένη δὲ εἰς παρασκευήν*[k]—*Δευτέρᾳ σαββάτου...καὶ τῇ τρίτῃ... τῇ δὲ τετράδι*[l]—*Τῇ πέμπτῃ*[m]—*Παρασκευῆς οὔσης*[n]—*Τετράδα δὲ καὶ παρασκευὴν προσέταξεν ἡμῖν νηστεύειν*[o]—*Ἀλλ' ἐν κυριακῇ μόνῃ*[p]—*Ἀπὸ δευτέρας μέχρι τῆς παρασκευῆς καὶ σαββάτου*[q]—*Μιᾶς σαββάτων ἥτις ἐστὶ κυριακή*[r]—*Νηστεύουσι γὰρ δευτέρᾳ σαββάτων καὶ πέμπτῃ· ὑμεῖς δὲ ἢ τὰς πέντε νηστεύσατε ἡμέρας ἢ τετράδα καὶ παρασκευήν...τὸ σάββατον μέντοι καὶ τὴν κυριακὴν ἑορτάζετε*[s]—*Τὴν ἀναστάσιμον τοῦ Κυρίου ἡμέραν τὴν κυριακήν φαμεν*[t]—*Σάββατον δὲ καὶ κυρίακήν*[u].

So also in Origen: *Ἐὰν δέ τις πρὸς ταῦτα ἀνθυποφέρῃ τὰ περὶ τῶν παρ' ἡμῖν κυριακῶν ἢ παρασκευῶν*[x]. And in Dionysius, bishop of Corinth, in his letter to Soter, bishop of Rome:

[f] Horace, Sermon. i. ix. 69.
[g] ii. 47. 194. C.
[h] ii. 59. 206. E.
[i] iii. 6. 216. E.
[k] v. 13. 251. E.
[l] v. 14. 252. A.
[m] v. 14. 252. E.
[n] v. 14. 253. E.
[o] v. 15. 255. C.
[p] v. 17. 258. C.
[q] v. 18. 258. D.
[r] v. 19. 259. B.
[s] vii. 23. 309. B.
[t] vii. 30. 312. E.
[u] viii. 33. 364. E.
[x] Contra Celsum, viii. 22. Opp. i. 758. F.

Τὴν σήμερον οὖν κυριακὴν ἁγίαν ἡμέραν διηγάγομεν [y]. And in Clemens Alexandrinus: *Τῆς τετράδος καὶ τῆς παρασκευῆς* [z]. And in Tertullian: Cur stationibus quartam et sextam sabbati dicamus, et jejuniis parasceuen [a]—Exceptis scilicet sabbatis et dominicis [b]. Stephen Gobarus [c]: *Ὅτι ἡ κυριακὴ ἡμέρα ἡ αὐτή ἐστιν ἡ ὀγδόη καὶ πρώτη, καὶ ὅτι οὐχί.* The first instance on record of the use of *ἡ κυριακὴ* in this strictly Christian sense is of course Rev. i. 10; yet if Clemens Alexandrinus is to be believed, Plato (in Politia) had a presentiment of that future application of the day and of the name of the day: *Τὴν δὲ κυριακὴν ἡμέραν, ἐν τῷ δεκάτῳ τῆς* Πολιτείας *ὁ Πλάτων διὰ τούτων καταμαντεύεται* [d], *κ᾽, τ. λ.* The observance of these two days, the *κυριακὴ* and the *παρασκευὴ*, all over the Roman empire, as holidays, is reckoned one of the constitutions of the first Christian emperor, Constantine the Great [e]. And that of Sunday was finally made binding by a law of the emperor Leo's [f], between A. D. 457 and 474. Yet the common consent of Christians had consecrated the Lord's day as a day of religious meeting and solemn observance long before this [g]. In this respect the Apostolical Constitutions enjoin no fresh rule; but one which custom had already established [h]: *Ἐργαζέσθωσαν οἱ δοῦλοι πέντε ἡμέρας· σάββατον δὲ καὶ κυριακὴν σχολαζέτωσαν ἐν τῇ ἐκκλησίᾳ διὰ τὴν διδασκαλίαν τῆς εὐσεβείας.* And though Chrysostom in one place speaks of the Lord's day as not yet devoted at Antioch exclusively to religious purposes, as he contends it ought to be [i]; yet in another he recognises it as a day of rest and of intermission from all kinds of secular employment [k].

y Eusebius, E. H. iv. 23. 145. D.

z Strom. vii. xii. § 75. p. 263. l. 34. Cf. Basil, iii. 186. D. E.: Epp. xciii. ad Cæsarium: Epiphanius, i. 910. B. Aëtii, vi.: 1104. C. D. Expositio Fidei, xxii.

a Opp. ii. 417, 418: Adv. Psychicos, 14.

b Ibid. 418: Adv. Psychicos, 15.

c Apud Photium, Cod. 232. p. 289. l. 23.

d Strom. v. xiv. § 107. p. 75. l. 27. Cf. Euseb. Præp. Evang. xiii. 13. 336. 33.

e Eusebius, Vita, iv. xviii. 534. Cf. xix. xx. xxiii.: De Laudibus, ix. 628. B. C: xvii. 661. A. Sozomen, i. viii. 412. B. C.: Julius Pollux, Chronicon, p. 266: Anecdota Græca Paris. ii. 91. 26–33.

f Theodore Lector, i. 553. D.: Anecdota Græca Par. ii. 103. 15.

g Cf. Socrates, v. 22. 287, 288; vi. 8. 813. A.: Sozomen, vii. 19. 734–736: Theodore Lector, i. 14. 42. D.

h Lib. viii. 33. 364. E.

i i. 276. D. E. Homilia xxiv. De Baptismo Christi, (Ducæi, Parisiis, 1636.)

k v. 288. C. Sermo xxii. De Eleemosyna, &c.

SECTION VII.—*On the Latin* hebdomada *and* septimana, *and on the English* week.

In the time of Dio Cassius the planetary names of the days of the week had been received into general use all over the empire; and this implies an equally general use of the hebdomadal cycle: Ἀλλ' ἐπειδὴ καὶ πάνυ νῦν τοῖς τε ἄλλοις ἅπασι καὶ αὐτοῖς τοῖς Ῥωμαίοις ἐπιχωριάζει, καὶ ἤδη καὶ τοῦτό σφισι πάτριον τρόπον τινά ἐστιν[l], κ', τ. λ. To the universality of the reception of the sabbath at least, (which too implies the same thing,) among the rest of the people of the ancient world besides the Jews, at the epoch of the Gospel æra, we had occasion to produce some testimonies in our former works[m]. It is asserted in some of the passages quoted *supra.* Nor would it be correct to resolve the fact of this general recognition and general adoption both of the cycle and of the sabbath, simply into the fact of the dispersion, and into the example and influence of the Jews. Among the Greeks the traditionary reverence of the seventh day, as sacred to Apollo, might contribute materially to predispose them to this of the sabbath; and in other instances a traditionary recollection even of a primitive sabbath itself might conspire to the same effect.

Such however being the state of the case at this period in the history of the world, we are justified in understanding particular allusions to the cycle of seven, in the writings of the same æra, under particular circumstances, as intended in all probability of the hebdomadal cycle:

> Non quia septenas noctes sejuncta cubaris;
> Candida tam fœdo brachia fusa viro[n].

Arma militum septimo die semper respexit.... exercitium septimi diei fuit omnium militum[o]—Capitolium septimo die quum in urbe esset adscendit[p].

[l] xxxvii. 18.

[m] Dissertations, xli. vol. iii. p. 156. note. Cf. The Exposition of the Parables, vol. v. p. 302. note. Hence it is that Claudius Rutilius, in the passage quoted supra, p. 425. continues,

> Atque utinam nunquam Judæa subacta fuisset
> Pompeii bellis imperioque Titi.
> Latius excisæ pestis contagia serpunt,
> Victoresque suos natio victa premit.—Itinerarium, 395.

[n] Propertius, ii. xvi. 23.

[o] Historiæ Aug. SS. Gallicani Avidius Cassius, 6.

[p] Ibid. Lampridii Alexander Severus, 43.

The vernacular Jewish term for the sabbath was consequently naturalized both in Greek and in Latin; and was adopted familiarly by writers in each of those languages of the same period; in the form of *σάββατον* or *σάββατα* by the one, and in that of sabbatum or sabbathum by the other.

> Εἰ δέ σε σαββατικὸς κατέχει πόθος, οὐ μέγα θαῦμα·
> ἔστι καὶ ἐν ψυχροῖς σάββασι θερμὸς ἔρως [q].

Ἀλλὰ Ἰουδαῖοι σαββάτων ὄντων ἐν ἀγνάμπτοις καθεζόμενοι [r]—

> Nec pluvias vites: nec te peregrina morentur
> Sabbata [s] . . . .

Accendere aliquem lucernam sabbathis prohibeamus [t].—In Judæa rivus sabbatis omnibus siccatur [u]. It is used too in the classical writers of the same period as regularly for the seventh day, or for every period of seven days, as by the Jews themselves. Thus in Suetonius' life of Tiberius [x]: Diogenes grammaticus, disputare sabbatis Rhodi solitus, venientem eum ut se extra ordinem audiret non admiserat; ac per servulum suum in septimum diem distulerat. hunc Romæ salutandi sui caussa pro foribus adstantem nihil amplius quam ut post septimum annum rediret admonuit. The former incident must have happened some time during Tiberius' retirement at Rhodes, between U. C. 748 and U. C. 757.

It remains to say something on the origin of the different terms for the week, in the Greek, the Latin, and the English languages respectively.

The Greek word for the week is *ἑβδομάς*: and *ἑβδομὰς*, as we have seen, is applied to the seventh day of the cycle also, as much as *ἑβδόμη ἡμέρα*, or *ἡ ἑβδόμη*; *ἑβδομὰς*, in fact, being equivalent to *ἑβδόμη ἡμέρα*. Ἑβδομὰς is derivable from *ἕβδομος*, according to the same analogy as *ἑξὰς* from *ἕκτος*—*τετρὰς* from *τέταρτος*, (the former is classical in the Greek language,) or as *ἑπτὰς* from *ἑπτὰ*, which occurs in Photius [y]. It is used *ἁπλῶς* for the number *seven*: Καὶ *μυρία τοιαῦτα ἁγιά-*

[q] Anthologia, i. 25. Meleagri lxxxiii.
[r] Plutarch, De Superstitione, cap. viii.
[s] Ovid, Remedia Amoris, 219.
[t] Seneca, Opp. iii. Epp. xcv. 47.
[u] Pliny, H. N. xxxi. 18. 577. The Rivus Sabbaticus, on the way from Berytus to Antioch, between Arcæa and Raphanea. Cf. Josephus, De Bello, vii. v. 1.
[x] Cap. xxxii. § 5.
[y] Bibl. Cod. 187. p. 144. 14—27. Nicomachus of Gerasa, Ἀριθμητικὰ θεολογούμενα.

ζων τὸν ἀριθμὸν παρατίθεται Ἕρμιππος ὁ Βηρύτιος ἐν τῷ περὶ ἑβδομάδος[y]—Ἡ δὲ ἑβδομὰς—τί ἄν τις καὶ εἴποι; τύχη καὶ καιρὸς Ἀθηνᾶ καὶ Ἄρης ... Ἀμαλθείας κέρας ... Ὄσιρις[z], κ', τ. λ.

Were the lines (ascribed to Solon[a]) on the different stages of human life as measured by periods of seven years in succession to be considered genuine; the use of ἑβδομὰς, in this sense of the period of seven absolutely, would be as old among the Greeks as Solon. But one of the first instances of such an use of the word in that language, extant at present and of good authority, we consider to be that which occurs in another fragment of the same Aristobulus of whom we made mention supra[b]: *Δι' ἑβδομάδων δὲ καὶ πᾶς ὁ κόσμος κυκλεῖται τῶν ζωογονουμένων καὶ τῶν φυομένων ἁπάντων· τὸ δὲ σάββατον αὐτὴν προσαγορεύεσθαι διερμηνεύεται ἀνάπαυσις οὖσα.*

In the Latin language ἑβδομὰς becomes hebdomas and also hebdomada. Both are classical. The latter occurs in a fragment of Varro's, (one of whose works too was entitled Hebdomades[c]:) Tum ibi addit[c] se quoque jam duodecimam annorum hebdomadam ingressum esse, (his 78th year) et ad eum diem septuaginta hebdomadas librorum conscripsisse: ex quibus aliquammultos quum proscriptus esset (U. C. 711, 712.) direptis bibliothecis suis non comparuisse. The former is found in one of the epistles of Cicero to Tyro, written U. C. 703, B. C. 50, in the year of his return from his province; on which occasion Tyro had been left by him on his way back at Patræ in Achaia sick. And he writes to him in this letter to admonish him, though now convalescent, to take care of his health, Ne in quartam hebdomada incideret[d]: the context of which allusion and the rest of the history of this sickness prove that hebdomas is used here in the sense of a term or period of seven days; and therefore very nearly in that of our word week.

y Clemens Alex. Strom. vi. xvi. § 155. p. 188. l. 34.

z Photius, loc. cit.

a Poetæ Minores, Solonis Fragmenta, xiv. Cf. Clemens Alex. Strom. vi. xvi. § 154. p. 188. l. 14. See also the remains of Hippocrates, in which ἑβδομὰς occurs repeatedly in the sense of a period of seven days. Thus Opp. iii. (Kuhn.) 714. Aphorismi, 74, Τῶν ἑπτὰ ἡ τετάρτη ἐπίδηλος· ἑτέρης ἑβδομάδος ἡ ὀγδόη ἀρχή· θεωρητὴ δὲ ἡ ἑνδεκάτη· αὕτη γάρ ἐστι τετάρτη τῆς ἑτέρης ἑβδομάδος, κ', τ. λ.

b Præparatio Evang. xiii. 12. § 13. 317.

c A. Gellius, iii. 10.

d Ad Familiares, xvi. 9.

The proper Latin word for week however is *septimana:* about the derivation of which the opinions of learned men are divided. Hebdomada dicta, says Isidore[c], a numero septem dierum, quorum repetitione et menses et anni et sæcula peraguntur. ἑπτὰ enim Græci septem dicunt. hanc nos septimanam vocamus, quasi septem *luces:* nam *mane* lux est. octavus autem dies is est ad quem reditur, et a quo rursus hebdomadis series orditur. On this principle, septimana is resolvable into septem and mane: and if we are not mistaken Mr. Ideler, in his Technical Chronology, has acquiesced in this explanation of the word.

But in our opinion it is erroneous. *Septimana* is properly derived not from septem and mane, but from septimus; according to the same analogy as similar terms from the rest of the ordinals in the Latin language; primanus from primus, secundanus from secundus, tertianus from tertius, quintanus from quintus; and so forth: designations and modes of speaking which are very common in the Roman historians, to discriminate the officers or soldiers of one legion from those of another; the legions themselves being distinguished asunder by their number, *prima, secunda,* &c. In Tacitus in particular the instances of this idiom are exceedingly numerous. We shall be content to cite one example of it, taken from a fragment of Cato the censor's oration in Q. M. Thermum; and therefore one of the oldest which could be produced in illustration of it: Primanus Tribunus[f]: a Tribune belonging to the Prima legio. To designate the order of the nones in the months of the Roman calendar, (in which they always fell on the fifth day or on the seventh,) Macrobius observes that the month in the former case quintanas habet nonas; (that is, ad quintum diem pertinentes); in the latter septimanas habet nonas; "has its nones attached to the seventh day." So also Censorinus[g].

There cannot be much question then that septimanus means "of or belonging to septimus;" and that septimana

[c] Origines, v. 32: 41. A.

[f] Apud Festum, lib. xiv. 372. 8. Primanus Tribunus, apud Catonem; in ea quæ est contra Thermum de suis virtutibus. Just before: Primanus tribunus erat qui primæ legioni tributum scribebat.

[g] De die Natali, xx.

used absolutely, and in the feminine gender, and as a substantive, is to be understood with the ellipsis of Periodus *; the period of the seventh day, the period belonging to the seventh day; that is, the hebdomadal cycle or week. Mr. Ideler has observed that, as far as he knows to the contrary, it occurs in this sense first in the Codex Theodosianus.

With regard to the word *week* in our own language; in the German it is *weeka* or *wocke,* in the Gothic *wik. Midwocke, midweeka, midwik,* are still names in use in the cognate languages for the middle day of the hebdomadal cycle, which of course is the fourth (our Wednesday.) We are entirely of opinion that this word *wik* in its origin is absolutely the same as the Latin *vicis.* Some of the Latin grammarians recognise the obsolete nominative of this word in the form of *vix* [h], i. e. *viks.* W and v are kindred sounds: and the c in this word, properly pronounced, is hard like k: so that between *wik,* or *vik,* and *viks,* originally there could have been little or no difference.

The meaning of the word, under each of these forms, is the same; that of an order or succession, a turn and a return of a certain kind: in one word, of a cycle which ends only to begin again. In this sense it is used by Ulphila in the Gothic version of the New Testament. There can be little doubt, in our opinion, that the idea of a cycle (a regular and recurring order and succession) was always at the bottom of this word *week.* And as the word itself is older in the languages of the natives of the north than their connection with the Romans, it is one among other proofs that the division of time, so called and so discriminated among them, is older than that connection also.

* Unless it should be supposed that septimana was simply intended at first to be the Latin version and equivalent of the Greek ἑβδομάς.

[h] See Forcellini or Facciolati Lexicon, in voce.

LATERCULUS HEPTAZODII.

Days of the week and their names in various styles.

[i]

Day.	*Chronological.*	*Scriptural, Jewish, Syrian.*	*Planetary, Greek.*	*Planetary, Latin.*	*Patristic.*	*Arabian.*	*Arabian.*	*Arabian.*
i.	Feria prima	One of the week	Ἡλίου ἡμέρα	Dies Solis	Πρώτη Κυριακή Dies Dominicus	Aoual [a]	Awal [b]	Euvel [c]
ii.	Feria secunda	Two of the week	Σελήνης ἡμέρα	Dies Lunæ	Δευτέρα	Ahouan	Ahwan	Bahûn
iii.	Feria tertia	Three of the week	Ἄρεως ἡμέρα	Dies Martis	Τρίτη	Dgiabbar	Jobbar	Gebâr
iv.	Feria quarta	Four of the week	Ἑρμοῦ ἡμέρα	Dies Mercurii	Τετράς	Dibar	Dobbar	Debâr
v.	Feria quinta	Five of the week	Διὸς ἡμέρα	Dies Jovis	Πέμπτη	Mounes	Munes	Mûnis
vi.	Feria sexta	Six of the week	Ἀφροδίτης ἡμέρα	Dies Veneris	Ἑκτάς Παρασκευή	Arouba	Arubah	Arûba
vii.	Feria septima	Seven of the week Sabbath	Κρόνου ἡμέρα	Dies Saturni	Ἑβδομάς Ἑβδόμη Σάββατον Σάββατα Sabbatum Sabbathum	Schiar	Shiyar	Xijâr

a Masoudi "Golden Meadows," Notices et Extraits, i. 36. b Pococke, Specimen Historiæ Arabum, p. 318. Oxon. 1650. c Golius ad Alferganum, cap. ii. l. 15. Notæ, p. 15.

Days of the week and their names in various styles.

[ii]

Day.	*Abyssinian.*	*Persian.*	*Turkish.*	*Indians.*	*Hindi.*	*Hindu.*	*Maharatta.*
i.	Ehud [a] Sanbat Sabbath	Ruz jache [b] Yekshambe [c]	Pazar gun [c]	* Etwar [c]	Rabi-vár [d]	† Additavaram [e]	Adito [f]
ii.	Sanui	Ruz duiemi Doshambe	Pazar ertesi	* Peer * Somwar	Som-vár	Somavaram	Somo
iii.	Salus	Ruz siumi Sishambe	Sale	* Mungul	Mangal-vár	Mangalavaram	Mâgollo
iv.	Rebua	Ruz tzeharmi Charshambe	Charshambe	Boodh	Budh-vár	Boutavaram	Bodh
v.	Hamus	Ruz pengemin Panjshambe	Pershambe	* Jumerat	Vrishpat-vár Guru-vár	Brahaspativaram	Gourou
vi.	Areb	Ruz schesmin Juma Adina	Juma	Juma	Shukra-vár	Soucravaram	Soukrou
vii.	Sanbat kedimat, or ancient sabbath	Ruz hapthemi Shambe Hafta	Juma ertesi	* Sunneecher	Saníchar Sani-vár	Sanyvaram	Seni

* Hindu names, according to Prinsepp.

† In Jervis' Indian Metrology (Bombay, 1836,) p. 106, there is a list of the synonymes of the days of the week; (followed in each instance by the affix of *war* or *day;*) of which there are 35 for the first or Sunday, 20 for the second or Monday, 5 for the third, Tuesday, 3 for the fourth, Wednesday, 9 for the fifth, Thursday, 6 for the sixth, Friday, and 3 for the last or Saturday. This proves clearly the greater estimation of the first and the second day of the cycle in India; and particularly that of the first, as sacred to the sun.

a Murray's Life of Bruce, App. No. xlv. part i. p. 335. b Scaliger, De Emendatione, i. 8. c Prinsepp's Useful Tables, p. 14. Calcutta, 1836. d Ibid. p. 19. e Bailly, Astronomie Indienne, Disc. Prél. p. v. vi. From Le Gentil. f Anquetil Du Perron, Zend-avesta, Disc. Prél. ccxii. ccxiii. Note.

Days of the week and their names in various styles.

[iii]

Day.	Canarin.	Singalese.	Burmese.	Tibetan.	Siamese.	Anglo-Saxon.	English.
i.	Aïter	Eri-dá [b]	Tanang-ganvé [c]	Gyah nyí-ma [d]	Wan Alit [e] Day of the sun	Sun's-deagh [f] Sonnan däg [g]	Sunday
ii.	Somorvar	Sa-dudá	Tanang-lá	.... zla-va	Wan Tsan Day of the moon	Moon's-deagh Monan däg	Monday
iii.	Mangalevar	Ang-gahanuvádá	Ang-gá	.... míg-amar	Wan Angkaen Day of working	Tuisco's-deagh Tis-deagh Tives däg	Tuesday
iv.	Boudouvar	Ba-dá-dá	Buddha-hú	.... thag-pa	Wan Poeth Day of meeting	Woden's-deagh Vodene's däg	Wednesday
v.	Braspativar	Bra-has-pa-ting-dá	Kyása-padé	.... phur-bu	Wan Prahat Hand-day	Thor's-deagh Thunre's-deagh Thunores däg	Thursday
vi.	Soukravar	Siku-rá-dá	Sok-kyá	.... pa-sangs	Wan Sock Day of rest	Friga's-deagh Frea's-deagh Friga däg	Friday
vii.	Senvar	Sena-su-rá-dá	Cha-né	.... spén-pa	Wan Sauw Attracting day	Seater's-deagh Sater's-deagh Sœtre's däg	Saturday

a Anquetil Du Perron, Zend-avesta, Disc. Prél. ccxii. ccxiii. Note. b Prinsepp's Tables, p. 19. c Ibid. d Ibid. e Kæmpfer's History of Japan, B. i. ch. ii. p. 41. f Verstegan, loc. cit. g Professor Trithen, Taylor Professor of Modern Languages in the University of Oxford.

Days of the week and their names in varioas styles.

[iv]

Day.	*French.*	*Bas-Breton.*	*Danish.*	*Swedish.*	*Old High German.*	*Old Frisian.*	*Old Norse.*
i.	Dimanche	Dys-*sul* [b]	Soldag [c] Sundag	Sontag [d] Söndage [e]	Sunnun dag [f]	Sonna dei [h]	Sunnu dagr [i]
ii.	Lundi	Dy-*llun*	Maendag	Mondag [d]	Manin tac	Mona dei	Mana dagr
iii.	Mardi	De-*Meurz*	Tiisdag Thissdag Thiissdag Tingsdag Erichdag.	Tisdag [d]	Tiuwes tac	Tys dei	Tyrs dagr [k]
iv.	Mercredi	De-*Mercher*	Onsdag Othinsdag Midviku Midvigu	Oden'sdag [d] Onsdag [e]	Mittawecha	Werns dei	Odins dagr
v.	Jeudi	Di-*Ziou*	Thorssdag	Torsdag [d] Thorsdag [e]	Donares tac	Thunres dei	Thors dagr
vi.	Vendredi	Der-*Guener*	Fredag Freiadag	Fredag [d]	Fria dag	Frigen dei	Fria dagr
vii.	Samedi [doc a) *Disate* (in Langue-	Des-*Sadorn*	Lóverdag	Logerdag [d] Lördage [e]	Sambar tag Sonnabend [g]	Sater dei	Lauger dagr

a Monde Primitif, iv. 85: Liv. i. ch. iii. iv. b Ibid. c Olaus Wormius, Fasti Danici, i. xv. p. 49—57. Cf. iii. vi. 169: Monumenta Danica, i. iv. 9—20: ii. 117: Vossius de Idololatria, ii. cap.33. d Monde Primitif, lib. i. ch. iii. sect. v. tom. iv. 54, 55. e Professor Trithen. f Idem. g Monde Primitif, loc. cit. h Professor Trithen. i Idem. k Cf. Olaus Wormius, Fasti Danici, i. xv. 52.

CHAPTER III.

On the true theory of the hebdomadal cycle: and on the difficulties connected with this subject.

SECTION I.—*Objections to the use of the simple Julian year proleptically, or as carried back to any distance.*

THOUGH there is none of the measures of time of which both the theory and the praxis or administration would seem to be more simple than those of the hebdomadal cycle; there is none about which so much perplexity does in reality exist. Chronologers take it for granted that it is the easiest thing imaginable to trace this particular measure either forwards or backwards to any extent; and that the results may be depended on with equal certainty in either case. And indeed as the course of time is actually going on in each of its measures, (and in this among the rest,) at present; it is possible to trace it as far forward from the present day as we please, and probably to be uniformly right in the results: unless there should be reason to suppose that the course of time will not continue to go on in each of its measures, as it is actually going on at present. But with regard to the course and succession of this same cycle, when it is attempted to investigate it backwards from the present day, the case is different; though chronologers have not been aware of the distinction, and consequently have never paid any attention to it.

In tracing the course of hebdomadal time, either forwards or backwards, the instrumental means which chronology employs is the solar cycle, understood in the technical sense of the term. The cycle of 28 Julian years (the cycle of the Dominical letter) is the perpetual measure of hebdomadal time in terms of annual as the same thing with Julian, of which chronology makes use. It follows that between this cycle, as applied to this particular purpose, and the Julian reckoning of annual time, there is no difference. To carry back the one is to carry back the other; and to carry back either is to carry back one and the same method of

reckoning noctidiurnal and hebdomadal and annual time all at once; viz. that which exists *de facto* in all those respects at present; the simple Julian reckoning of time according to all its measures, unmodified and unaltered, and in its constitution, its laws, and its administration, howsoever far back from the present day it may be carried, absolutely one and the same. It must be supposed then that, even thus pushed back to any conceivable distance of time, it is just as competent to answer its proper use and purpose as at present. To this supposition there are serious objections, which we shall proceed to state.

SECTION II.—Objection i. *From the use of the Julian year proleptically, simply as proleptical.*

In the first place, though one simple and uniform standard of annual time, which we call the Julian, is in use at present, (or was so at least, up to the date of the Gregorian correction,) it cannot be said that it was always in use. It cannot be denied that the Julian calendar, actually in use either now or heretofore, was derived from the Roman correction of the Dictator Cæsar; that it might have an actual existence from the date of that correction, and that the form and mode of its existence ever after might always be the same; yet that, up to the very time of the Dictator Julius Cæsar, it could have no actual existence in any shape or form whatsoever; none at the utmost but what we ourselves conceive it to have had, and what we ourselves assign it at the present day hypothetically.

Now this being the case, to take it for granted that what could have only an *hypothetical* or *imaginary* existence might nevertheless be adopted and applied as the *actual* measure of *actual* annual time, (to say the least,) was illogical and precarious. It ought to have occurred to chronologers to ask themselves the question, Whether the Julian calendar of their own day, which never had a real existence beyond a certain point of time comparatively of recent date, was competent to represent any of those forms of the calendar reckoning of annual time distinct from itself, which were actually in existence at points of past time, so much more remote than the actual date of the Julian correction? Or, to say nothing of

any of these, Whether the present reckoning of annual time in the shape of Julian, pushed back to any distance before the date of the Julian correction, was competent to represent that *one* type and that *one* form of annual time, which they might be sure must always have had an actual existence, and the same kind of existence too: the natural solar or tropical year? For after all the true standard of reference for the actual course of annual time perpetually is this, and this alone; especially while by hypothesis none other of a positive or civil description, (like the Julian,) even as modelled upon it and as accommodated to it, was in actual existence along with it.

It should have occurred to chronologers therefore above all things to inquire, whether the simple invariable civil standard of their own time, without any change or modification, was calculated to represent this one simple and invariable standard of nature, at any period of time, which might be proposed, indifferently? If not; the conventional standard, which they have been in the habit of substituting for the standard of nature under all circumstances and at all times alike, is a mere fiction of their own. The practice then, which has hitherto prevailed, of carrying back the Julian calendar to any distance of time so long before it actually came into existence, and of applying it to the same use and purpose in the actual measurement of annual time, at all periods in the history of the world before the time of Julius Cæsar, was objectionable in principle. It was always liable to the suspicion that what could have only an imaginary existence at such times, might very possibly and even very probably be no actual measure of the truth. There was always, (and at such times as well as at all others,) *one* actual measure of the truth; a measure always the same, always consistent with itself, and always in actual existence: there was not before a certain time such an actual measure as the Julian. It did not follow that as an hypothetical measure of the truth, so much before its time, it must necessarily coincide with the actual measure of the time being: and if it did not, then, without modification and correction of some kind, it must be manifestly inapplicable for the same purpose as that.

Nor can it be retorted upon us that even we have laid ourselves open to this objection, by making use of the Julian reckoning in our own tables so long before the historical date of the Julian correction itself. We make use of *a* Julian reckoning; but not of *the* actual Julian reckoning before the proper point of time: and the Julian reckoning which we do use continually until then is only the conventional substitute for the time being of the natural, which every one must allow always to have had an actual existence, and always the same kind of existence. And we use even this Julian substitute of natural annual time only as constantly so modified, and so proportioned to the standard of nature, as to answer the purpose both of the civil and of the natural type of annual time at once; to be constantly Julian in every essential respect, and yet to be constantly natural also: in one word, to be the nearest approach to the standard of nature, at all times and under all circumstances, which was possible by means of a positive and conventional substitute for it.

SECTION III.—Objection ii. *The proleptical Julian reckoning not applicable under any circumstances before* A. D. 225, *or at the earliest*, B. C. 45.

In the next place, though the correction of Julius Cæsar, from which we derive the modern Julian calendar, came into actual existence at Rome in B. C. 45, it did not assume the form of the calendar which is in existence at present, (it did not at least assume it so as to retain it ever after,) before A. D. 224. It is an old and inveterate prejudice of chronologers that the Julian correction of Cæsar was a perfect exemplar of the Julian calendar from the first; that the kalends of January in the first Julian year were set at par with the first of January; and never, except for a few years soon after the date of the correction, swerved from that state of coincidence with it.

No opinion could be more at variance with the actual matter of fact. The first kalends of January in the Julian æra did not coincide with the first of January B. C. 45, but on the contrary with December 30, B. C. 46; and the date of the first total and ultimately permanent (if not of the first *actual*) coincidence of the Julian correction with the

Julian calendar, properly so called, was not the first Julian year, B. C. 45, but the 269th *ex kalendis Martiis*, A. D. 224, or the 270th *ex kalendis Januariis*, A. D. 225. We thank God that it is in our power to produce such proofs of each of these assertions, as can leave no doubt of its truth; though the proper time for their production is not the present, but when the Roman calendar and the Julian correction itself shall come under consideration.

If this however was the case, it is self-evident that to carry back the modern Julian calendar beyond A. D. 225, to apply the solar cycle of that calendar to the course and succession of hebdomadal time in terms of annual Julian time, beyond A. D. 225, without modification or correction of any kind, and simply in conformity to the rule of its administration in the Julian calendar at present, must lead to erroneous results. In fact, beyond this point of time of March 1, A. D. 224, or of January 1, A. D. 225, the modern Julian calendar, as the perpetual measure of actual annual time, is itself a mere fiction; an hypothesis of chronologers and nothing more. It has no real existence as the Julian of the time being, nor any claim to the name and title of Julian, in that sense, before A. D. 224 or 225. There was an actual Julian reckoning before either of those dates, but it was not the same with this; nor, as we may add, the same with the true Julian type of natural annual time for the time being, any more than with this.

SECTION IV.—Objection iii. *The proleptical Julian year inapplicable beyond* B. C. 672, *even though applicable beyond* B. C. 45.

In the third place, though it had been just in the principle and allowable in the application of such an assumption, to carry back the simple Julian standard of annual time, and the simple Julian measure of hebdomadal, beyond A. D. 225, beyond B. C. 45, and even as far as B. C. 672; yet unless chronologers had stopped short *there*, and unless they had paused in their further application of the simple Julian rule in order to take into account a certain matter of fact, which required to be taken into account at that time, but of which all without exception have been ignorant in common and re-

gardless in common; it would have been impossible to continue it in the same way, and not to find all the subsequent results of its application vitiated and thrown wrong by this ignorance and by this neglect.

The interruption of the regular law of the succession of night and day by the solstice of Joshua, and by the solar retrogradation in the time of Hezekiah, affected none of the measures of time so directly as the mean cycle of night and day; whether in itself or in periods of seven in succession. And this interruption, as we have shewn, first took complete effect in B. C. 672. Between B. C. 672 and the present day the interruption could not be perceptible; but between that date and the beginning of things it must some where or other be perceptible. No representation consequently of the course and succession of hebdomadal time, founded on the mean standard of that succession as supposed to be perpetually the same with the actual, could pass beyond this term of B. C. 672, according to the same law as before, without being falsified by the matter of fact at every step; and without being contradicted from that time forward by the actual hebdomadal cycle, as regularly as it might have been confirmed by it before. And yet no chronologer hitherto has so much as thought of taking any such interruption into account.

It is indeed an extraordinary phenomenon, and a standing reproach either to the common sense of Christian chronologers, and of Christian commentators on the Bible, or to their faith and sincerity, (which we would not willingly call in question,) that two such matters of fact as these miracles should have been written in such legible characters on the pages of Scripture for nearly 3000 years, and yet have been so generally overlooked or mistaken; and that, though probably no person of plain understanding and of common simplicity of purpose could give his attention to the account of either just as he finds it in the Bible, and not come to a right conclusion about it, yet men of learning and science, men of genius and education, philosophers, scholars, astronomers, not to say divines and commentators, (without a single exception to the contrary, as far as we know,) never should have done the simplest justice to Scrip-

ture; never have given it credit for the truth of its own statements, by receiving and construing plainly and literally what was plainly and literally delivered in Holy Writ: and even while they were professing to believe its accounts, they should practically have confuted their own professions, and have given only too much reason to suspect that they could not be sincere. For what difference is there between refusing to believe in either of these miracles, and professing to receive them as matters of fact and yet allowing them no effect? And is it not notorious that, so far as concerns any necessary consequence of two such matters of fact to any of the measures of time, the noctidiurnal, the lunar, the annual, and in particular to this of the hebdomadal which was the most directly affected by them of all; no such allowance ever has been made, nor, as far as we have been able to discover, was ever thought necessary to be made? So strong is prejudice; and so easily are men's eyes blinded against the perception of the plainest truths which are opposed to their habitual prepossessions. So little disposed too above all others are men of genius, men of letters or science, to judge and to act on the principle of faith, when it appears to be at variance with their own reason; though faith in such cases is sure to be confirmed by reason at last, and the most sensible person, the most judicious, the most worthy of the name of a philosopher or lover of wisdom, is ultimately found to be he who began with submitting his prejudices to his faith, and with believing at first even against his own impressions, out of deference to an infallible assurance of the matter of fact; and not he who set up his reason (that is, his own irrational prejudices) against his faith; or while he was professing to defer to the testimony of Scripture was all the while distrusting and disallowing it, as if given to something which he did not consider to be possible.

SECTION V.—Objection iv.—*The principle of the* reditus retro, *exemplified in the proleptical use of the Julian reckoning, objectionable in itself.*

In the fourth place, the method in general, which chronologers have hitherto followed in tracing the course of time in any of its measures, the method of the *reditus retro,* is

faulty in principle. It is radically defective and objectionable. It is an *ὕστερον πρότερον.* It is contrary to the order of nature and to the matter of fact: for the course of time, in all and singular its measures, from the first has been forwards; and to invert this order, and to endeavour to find out the downward course of time by following it backwards according to a rule and a prescription borrowed from the state and the manner in which it is existing and proceeding at present, is contrary to the reason of things.

Here however some explanation is necessary. The course of time, it may be said, is naturally progressive; yet having once been fixed and defined by the event, (as the course of past time necessarily must have been,) how can it be impossible to trace it backwards?

No doubt it is not impossible. Nor do we assert it to be so. It is and must be true *a priori* that the course of time, such as it has come downwards, must be capable of being followed upwards. But we must first of all know in what manner it has come downwards: for unless we go back in the same steps, it cannot be said that we are retracing the same course upwards which has come downwards. The *ἀναποδισμὸς* must be exactly the reiteration of the *προποδισμός.* There is but one course marked out by the downward steps of time. There is but one then which can be followed in tracing it through those steps upwards.

If therefore we propose to investigate the course of time backwards from the present day, we must begin with endeavouring to ascertain the course of time downwards to the present day. And this being done, the method of the *reditus retro* will be as safe and sure as it is easy and practicable; but otherwise it will only lead astray. The attention of chronologers ought to have been directed (uniformly and exclusively directed if necessary) to the solution of this *one* problem; the true primary epoch of all the measures of time which have any connection with the existing scheme of things: and they should have persisted in their endeavours to solve this problem until they had succeeded. For that the problem itself is incapable of solution, none but an atheist or a fatalist, who might deny that time itself ever had a beginning even in connection with human history,

could consistently maintain. On the contrary had competent persons set themselves in earnest about its solution, more especially had they gone to work with a full purpose beforehand to do justice to Scripture by allowing its simple historical testimony to all matters of fact, (miraculous or not,) its legitimate weight and force; we doubt not but that it would long since have been determined. Such an implicit submission of human prejudices to divine reason in all things would have led to the discovery. It would not have been reserved for the present day to decide a question so interesting and so important at all times, as that of the *natale mundi* and of the epoch of human time.

The first experiment which might have been made very possibly would have proved successful. For the year B. C. 4004 was as likely to present itself, as the subject of examination in the first instance of all, as any; and had the test of calculation been fairly applied to that, it would have been found to be distinguished by characteristics which must have appeared, (even *prima facie,*) competent to designate and point it out as the very year of which calculation was in search: characteristics which would not be seen to meet in any year between the present day and B. C. 4004, except one of an equally remarkable kind; and between B. C. 4004 and any year beyond that would not be found to meet again, under the same circumstances in all respects, within scarcely any limits which could be assigned.

It is needless to add that the method which we ourselves have employed for the solution of the same problem is the reverse of that which chronologers hitherto have been following. And to this circumstance of distinction, more than to any thing else, under the Divine blessing on our undertaking, is it due that the researches which we have instituted have led to the discovery of the truth; and that the scheme, which we have been enabled to propose as the result of all our inquiries, is a simple, harmonious, and consistent representation of the course of time in each and all its measures from first to last; agreeable to matter of fact perpetually, and in nothing more so than in this one measure of the hebdomadal cycle, which the treatment of chronologers hitherto has rendered the most difficult of all to reconcile

to other and independent tests and criteria of truth. Such a representation may be followed either upwards or downwards; and if traced downwards, it will not be found to fail until it arrives at our own times; and if traced upwards, it will not stop short until it returns to the beginning, and to the point from which it set out.

Nor as the actual state of the case, with respect to this particular measure of time in its constant application to annual in the sense of Julian, holds good at present, would it be allowable to trace it from the present day beyond the epoch of A. D. 225, by assuming one *point* of time at *present*, and an hebdomadal date which was matter of fact at that moment, and *another* point of time anterior to A. D. 225; and then calculating the absolute number of days and nights between the two, and dividing the sum by the ordinary measure of the hebdomadal cycle in days and nights, the number seven. The hebdomadal place or character of the last in this interval being known from observation; that of the first, it might be supposed, would be determinable consequentially from it.

But this method of proceeding too, though seemingly different from that of the common solar cycle, is in reality the same with it. Both lead to the same result; and if the technical rule of the solar cycle is inapplicable to the determination of such problems as these beyond A. D. 225, so also is this method, which is the same rule differently applied. Both are the simple Julian rule of annual and of hebdomadal time in conjunction, carried beyond A. D. 225 without modification and correction.

But the truth is, as we have already observed, hebdomadal time in conjunction with annual, or annual in conjunction with hebdomadal, can be traced backwards legitimately only in the way in which it came downwards. The one proceeded in conjunction with the other before A. D. 225 in a different manner from what it did after A. D. 225; as we hope to shew by and by; and natural annual time itself receded in hebdomadal, before there was yet such a thing as the actual Julian year, according to a different law from what it did afterwards.

It should be remembered too, as we have already apprized

the reader[a], that the Julian reckoning of time in general, whether forwards or backwards, is first and properly (in fact exclusively) a reckoning of time by *days*. The Julian rule of the noctidiurnal cycle indeed is peculiar; but the length of the cycle, even according to the Julian rule, does not differ from its length according to any other. It is the same period of 24 hours in every case alike. The annual cycle in the sense of Julian is consequently only a larger form of the noctidiurnal. The hebdomadal cycle is the same thing, on a smaller scale; and therefore the hebdomadal cycle must be predisposed to be amalgamated with the annual Julian, because a lesser cycle must be predisposed to enter into and be combined with a larger of the same kind. The solar cycle, and the Julian cycle of annual time, on this principle are inseparably united; and in carrying back one we necessarily carry back the other. But the natural year is not a mere cycle of days, or complex of noctidiurnal cycles. It is a measure of time *sui generis*, entire in itself and independent of every thing else; always equal to itself and identical with itself. Days and weeks must enter into it, as well as months; but they do not constitute it; and they do not even measure it, except imperfectly. Neither the solar nor the hebdomadal cycle is competent to measure the natural annual cycle perpetually, as they do the Julian; a cycle which never stands still in terms of either of those, as the Julian does; but is perpetually receding in them, and changing its relation to them, while that of the Julian to each remains the same. In short, so long as the day and the week are one thing and the year is another, it is gratuitous to assume that the same rule, which measures noctidiurnal or hebdomadal time *per se* perpetually, will measure it also at all times, and under all circumstances alike, as mixed up with annual: yet this *is* and must *be* assumed when the simple solar cycle of the Julian year is carried indefinitely back, and applied to the natural year.

It must not however be supposed that in making these remarks we wish to detract from the utility or the importance of the Julian reckoning of time. The Julian calendar, (or something analogous to the Julian in all respects but this

[a] Dissertation iii. ch. i. sect. vi. p. 89–91.

one of being an actual form of the civil reckoning of annual time before a certain historical epoch,) is absolutely necessary. Chronology cannot dispense with it; history cannot dispense with it; and astronomy cannot dispense with it; nor any more before its actual existence than after. As the general standard to which all other modes of distinguishing and reckoning annual time for civil purposes are referrible in common; as the instrumental means of fixing the terms of epochs, and of bringing down annual time perpetually in integral periods called æras; and in particular as the medium of translating into intelligible language, of the same simple and invariable kind, the idiomatic and vernacular language of all other calendars whatsoever; the Julian calendar is the recognised calendar of chronology. It is the calendar of calendars. It is the conventional substitute of all other modes and forms of civil annual time. It is the interpreter of civil time every where, and at all periods of human history alike. Its language is universally understood, or easily may be so; and it makes the positive and artificial language of civil time every where intelligible too.

By means of this calendar, as the link of connection between the present and the past, the astronomer converses with the heavens as truly and infallibly at any distance of time past, as at the present day; and the historian recalls and digests and records his facts with all the regularity, all the distinctness, and all the precision of ocular observation. Well might Scaliger say that, in comparison of the Julian correction, the victories and the triumphs of Cæsar were *meræ nugæ*[b]. The real monument of his fame is the Julian correction; a monument as imperishable as the calendar itself; and one which time, while undermining and destroying all other memorials of the past, so long as it respects and spares the calendar which is inseparable from its own existence, will only the longer perpetuate and maintain. Magno enim beneficio a C. Cæsare ad nos delata est ea anni forma, non solum omnium a Cæsare sed etiam ante Cæsarem retro temporum fidissima custos. qua nihil potuit neque usui populari convenientius neque memoriæ rerum conservantiæ accommodatius excogitari[c].

[b] De Emendatione, iv. 230. C.

[c] Ibid. v. 359. A.

Let it not be forgotten however that, even in bringing this form of the civil reckoning into being at its appointed period of time, Julius Cæsar himself was but an instrument in the hands of Providence; in the mind and purpose of which the Julian form of the reckoning of annual time preexisted and was contemplated from all eternity; and by the control and direction of which the way was prepared for its introduction in due time, into actual existence and actual use, in a very remarkable manner; as we hope to have a future opportunity of shewing.

Let it be remembered also that, to entail upon it the character which Scaliger gives it of "fidissima custos non solum omnium a Cæsare sed etiam ante Cæsarem retro temporum," one of two things must have been necessary even to the Julian reckoning of annual time; either that it should have had an actual existence itself from the first, or that it should always have agreed with that which had. The first of these conditions is excluded; for no assumption or hypothesis of our own can make the Julian reckoning *actual* a moment before its time. The second then alone remains; viz. That of *a* perpetual Julian reckoning at all times previously, but not THE Julian one before the proper time; a reckoning always essentially and in principle Julian, yet not actually Julian while there was yet no such thing in existence; a Julian reckoning for the time being always as true to the natural reckoning of annual time as to the Julian itself; a perpetual Julian antitype of the same natural prototype, nominally indeed, at stated times, differing from itself, but essentially always the same, because always identical with that which in its own nature is invariable. Such, as we have explained, are the Julian Types of our own Fasti.

CHAPTER IV.

Synopsis of noctidiurnal and of annual time in hebdomadal, both natural annual, and civil annual or Julian, on the twofold hypothesis of a variable Julian type, and of a fixed and invariable one.

SECTION I.—*Statement of the case.*

IN the course and succession of mean noctidiurnal time from first to last, the first matter of fact which holds good, and always has done and always must continue to do so, is *this*; that it began on the feria prima. The next is that it began at the same moment as mean natural annual time; and both at the mean vernal equinox. The third is that, as reduced to the Julian reckoning and to the Julian notation both of noctidiurnal and of annual time perpetually, it began on the feria prima and at the mean vernal equinox, as each represented by April 25 at midnight, A. M. 1. B. C. 4004.

A fourth actual matter of fact with respect to this course and succession notwithstanding is *this*; that if traced perpetually backwards from the present day to the beginning, according to the same law subject to which it was brought downwards, the epoch of the whole succession in terms of the Julian reckoning, at last, is found to be April 24, not April 25.

Another matter of fact however, and that which serves to explain this apparent inconsistency, is that April 25, the Julian epoch of the succession at first, and April 24, the Julian epoch at present, must be the same; each being the feria prima; the former in the same succession traced uninterruptedly downwards, the latter in the same succession followed without interruption upwards. Things which agree with the same thing cannot disagree with each other. The order of feriæ has never varied. If April 25 then *de facto* was the first feria prima in the descending series, and April 24 *de facto* is the last feria prima in the ascending one, and this series itself is the same in both cases; it must be because April 25 at first and April 24 at present are the same thing under a different name.

The true explanation of this phenomenon is to be found in the change of the value of a given Julian term, in coming down from the first to the present day with an uninterrupted series of such terms; a change which began to obtain in B. C. 672. The Julian notation of noctidiurnal time perpetually is first and properly intended of the actual cycle of night and day; but if the mean is the same with the actual, it serves equally well for that. If the actual differs from the mean or the mean from the actual, it cannot serve for both: and if it is to continue to serve for either it must undergo some change with respect to the other. Before the time of the first miracle of Scripture the mean cycle was altogether the same with the actual; and since the time of the second it has continued the same with it also: but in consequence of these two miracles the actual cycle twice came to differ from the mean, and the joint effect of both at last amounted to *this;* that one actual cycle of night and day was to be assumed to have become equal to two mean ones. And this distinction having first taken full and complete effect in B. C. 672, it first began to appear, and it was first to be taken into account, in B. C. 672.

It follows that B. C. 672 is the point of time when one and the same term, in the constant Julian reckoning of the actual succession of night and day and of the actual succession of feriæ, acquires the power of denoting two of the mean in both; and one actual Julian noctidiurnal cycle and Julian feria becomes nominally equal to two of mean. And it is obvious, under such circumstances, that if there is any thing extraordinary in this phenomenon, it is due partly to an extraordinary matter of fact, unexampled in any thing of the same kind before or after; and partly to the imperfection of language, and to the want of conventional symbols, expressly contrived to meet such a case as this. It is easy to comprehend that, under such circumstances, the Julian epoch April 25, before B. C. 672, must drop to April 24, after B. C. 672; and yet that April 24, after B. C. 672, must still be the same thing in reality as April 25 before.

As then there are only these two Julian epochs of noctidiurnal and of annual time, one in terms of the other perpetually, which can be recognised either from the first or at

present, viz. April 25 and April 24; we propose to exhibit the scheme of both kinds of time, as they must both be conceived to have gone on in conjunction, (and in the hebdomadal cycle also, which has always accompanied each of them,) whether from this epoch of April 25 or from that of April 24: a comparative view or synopsis of noctidiurnal time and of annual (both natural, and civil in the sense of Julian,) in hebdomadal, whether from the epoch of April 25 or from that of April 24 indifferently; but from either as the first feria prima in hebdomadal time, and as the first actual cycle of night and day in the first annual cycle, both the natural and the Julian, B. C. 4004.

This synopsis will supply the best commentary on our preceding remarks and observations relating to the hebdomadal cycle. It will illustrate both the theory and the praxis of that cycle, according to the principles which we have laboured to inculcate, in a simple and intelligible manner. It will remove such doubts and scruples as may yet remain; and will confirm the truth of all that we have said on this subject.

With respect to the details of this synopsis, it is manifest that noctidiurnal, and hebdomadal, and annual time in the sense of natural, can have proceeded together only in one way from the first, and that way the constitution of nature: and consequently that, so far as this natural succession of all three in conjunction is concerned, there is no room for any hypothesis but that of the matter of fact; viz. that all three began together April 25, (or if we will April 24,) B. C. 4004, at the same moment; and that all three have gone on from that time to this in conjunction perpetually, but each according to its proper law.

With respect to annual time, in the sense of civil or positive, (that is, of Julian,) which must be supposed to have accompanied natural from the first; there may be room for different hypotheses, but only to a certain extent. There is no room for any hypothesis, with reference even to this, different from the matter of fact, that annual Julian time is to be dated from the very same epoch as annual natural, April 25 or 24, B. C. 4004; nor that the first type of positive annual time, in the sense of Julian, which could possibly

have come into being along with natural annual, could be any thing different from the first of the Julian types which actually enters our tables, and first accompanies the natural succession of annual time through one of our Julian periods. But there is room for a difference of supposition, whether the succession of annual Julian time, in conjunction with annual natural, shall be assumed to be carried on in a series of types, analogous to this, one after another; or in this one type, supposed to continue the same with itself perpetually.

The synopsis which we propose to exhibit will be adapted to each of these hypotheses; and therefore it will necessarily be distributed into two parts or tables; one, of the noctidiurnal and the annual succession in the hebdomadal, in the natural year and in the variable Julian types of our Fasti; the other, of the same thing in the natural year, and in the first Julian type of the Fasti supposed to be fixed and invariable. It is manifest that each of these representations will set out from a matter of fact at first, and from the same matter of fact; and therefore that at first there can be no difference between them. Both must be equally true or equally false. It may be presumed too, until the contrary is otherwise made to appear, that the hypothesis on which we propose to continue the second table, (that of the continuance of the same Julian type of noctidiurnal, hebdomadal, and annual time as at first,) is not an impossibility in itself; that the actual Julian year might have existed from the first; and yet if it had, that it could not have stood in any other relation to the actual natural year, which also existed from the first, but that of the first of our Julian types: and consequently that a fixed Julian type of actual annual time, agreeing in all respects to this first of our Julian types, is conceivable in idea at least, even from the first; and may be assumed to have been possible, even from the first, until the contrary is made to appear in some other manner.

NOCTIDIURNAL SUCCESSION. Table I.

TYPE I.

In the natural year, and in the variable Julian Types of the Fasti.

NOCTIDIURNAL SUCCESSION. Table II.

TYPE II.

In the first Julian Type of the Fasti, supposed to be invariable.

Hebdomadal Period I. 896 years, A. M. 1 to A. M. 897. B. C. 4004 to B. C. 3108.

	A			B	C		D			E		CC		DD			EE		F	G		H	I
Period	Sum of years	A. M.	B. C.			Feria	Mean Vernal Equinox	Feria	D. L.		Feria		Feria	Krion 1	Feria	D. L.		Feria	Feria	Cycles of seven days.	Feria	Sum of weeks	
i	112	1	4004		Apr. 24	7	Apr. 25	1	C	Jan. 3	1	Apr. 24	7	Apr. 25	1	C	Jan. 3	1	7	0		0	1
						6		7				23	6	24	7								
ii	140	113	3892	6	Apr. 23	5	Apr. 24	6	D	Jan. 4	1	Apr. 22	5	Apr. 23	6	C	Jan. 3	1	5	5,843	5	5,844	3
						4		5				21	4	22	5								
iii	112	253	3752	6	Apr. 22	3	Apr. 23	4	E	Jan. 5	1	Apr. 20	3	Apr. 21	4	C	Jan. 3	1	3	13,148	3	13,149	5
						2		3				19	2	20	3								
iv	140	365	3640	6	Apr. 21	1	Apr. 22	2	F	Jan. 6	1	Apr. 18	1	Apr. 19	2	C	Jan. 3	1	1	18,992	1	18,993	7
						7		1				17	7	18	1								
v	112	505	3500	6	Apr. 20	6	Apr. 21	7	G	Jan. 7	1	Apr. 16	6	Apr. 17	7	C	Jan. 3	1	6	26,296	6	26,298	9
						5		6				15	5	16	6								
vi	140	617	3388	6	Apr. 19	4	Apr. 20	5	A	Jan. 8	1	Apr. 14	4	Apr. 15	5	C	Jan. 3	1	4	32,140	4	32,142	11
						3		4				13	3	14	4								
vii	140	757	3248	6	Apr. 18	2	Apr. 19	3	B	Jan. 9	1	Apr. 12	2	Apr. 13	3	C	Jan. 3	1	2	39,445	2	39,447	13
						1		2				11	1	12	2								
	896																						

NOCTIDIURNAL SUCCESSION. Table I.

TYPE I.

In the natural year, and in the variable Julian Types of the Fasti.

NOCTIDIURNAL SUCCESSION. Table II.

TYPE II.

In the first Julian Type of the Fasti, supposed to be invariable.

Hebdomadal Period II. 896 years, A. M. 897 to A. M. 1793. B. C. 3108 to B. C. 2212.

	A			B	C		D			E		CC		DD			EE		F	G		H	I
Period	Sum of years	A. M.	B. C.			Feria	Mean Vernal Equinox	Feria	D. L.		Feria		Feria	Krion 1	Feria	D. L.		Feria	Feria	Cycles of seven days.	Feria	Sum of weeks	
viii	112	897	3108	6	Apr. 17	7	Apr. 18	1	C	Jan. 3	1	Apr. 10	7	Apr. 11	1	C	Jan. 3	1	7	46,750		46,752	15
						6		7				9	5	10	7								
ix	140	1009	2996	6	Apr. 16	5	Apr. 17	6	D	Jan. 4	1	Apr. 8	5	Apr. 9	6	C	Jan. 3	1	5	52,593	5	52,596	17
						4		5				7	4	8	5								
x	112	1149	2856	6	Apr. 15	3	Apr. 16	4	E	Jan. 5	1	Apr. 6	3	Apr. 7	4	C	Jan. 3	1	3	59,898	3	59,901	19
						2		3				5	2	6	3								
xi	140	1261	2744	6	Apr. 14	1	Apr. 15	2	F	Jan. 6	1	Apr. 4	1	Apr. 5	2	C	Jan. 3	1	1	65,742	1	65,745	21
						7		1				3	7	4	1								
xii	140	1401	2604	6	Apr. 13	6	Apr. 14	7	G	Jan. 7	1	Apr. 2	6	Apr. 3	7	C	Jan. 3	1	6	73,046	6	73,050	23
						5		6				1	5	2	6								
xiii	112	1541	2464	6	Apr. 12	4	Apr. 13	5	A	Jan. 8	1	Mar. 31	4	Apr. 1	5	C	Jan. 3	1	4	80,351	4	80,355	25
						3		4				30	3	Mar. 31	4								
xiv	140	1653	2352	6	Apr. 11	2	Apr. 12	3	B	Jan. 9	1	Mar. 29	2	Mar. 30	3	C	Jan. 3	1	2	86,195	2	86,199	27
	896					1		2				28	1	29	2								

NOCTIDIURNAL SUCCESSION. Table I.

TYPE I.

In the natural year, and in the variable Julian Types of the Fasti.

NOCTIDIURNAL SUCCESSION. Table II.

TYPE II.

In the first Julian Type of the Fasti, supposed to be invariable.

Hebdomadal Period III. 896 − 56 years = 840 years, A. M. 1793 to A. M. 2633. B. C. 2212 to B. C. 1372.

	A			B	C		D			E		CC		DD			EE		F	G		H	I
Period	Sum of years	A. M.	B. C.			Feria	Mean Vernal Equinox	Feria	D. L.		Feria		Feria	Krion 1	Feria	D. L.		Feria	Feria	Cycles of seven days.	Feria	Sum of weeks	
xv	112	1793	2212	6	Apr. 10	7 6	Apr. 11	1 7	C	Jan. 3	1	Mar. 27 26	7 6	Mar. 28 27	1 7	C	Jan. 3	1	7	93,500		93,504	29
xvi	140	1905	2100	6	Apr. 9	5 4	Apr. 10	6 5	D	Jan. 4	1	Mar. 25 24	5 4	Mar. 26 25	6 5	C	Jan. 3	1	5	99,343	5	99,348	31
xvii	140	2045	1960	6	Apr. 8	3 2	Apr. 9	4 3	E	Jan. 5	1	Mar. 23 22	3 2	Mar. 24 23	4 3	C	Jan. 3	1	3	106,648	3	106,653	33
xviii	112	2185	1820	6	Apr. 7	1 7	Apr. 8	2 1	F	Jan. 6	1	Mar. 21 20	1 7	Mar. 22 21	2 1	C	Jan. 3	1	1	113,953	1	113,958	35
xix	140	2297	1708	6	Apr. 6	6 5	Apr. 7	7 6	G	Jan. 7	1	Mar. 19 18	6 5	Mar. 20 19	7 6	C	Jan. 3	1	6	119,796	6	119,802	37
xx	56	2437	1568	6	Apr. 5	4 3	Apr. 6	5 4	A	Jan. 8	1	Mar. 17 16	4 3	Mar. 18 17	5 4	C	Jan. 3	1	4	127,101	4	127,107	39
xxi	140	2493	1512	6	Apr. 4	2 1	Apr. 5	3 2	B	Jan. 9	1	Mar. 15 14	2 1	Mar. 16 15	3 2	C	Jan. 3	1	2	130,023	2	130,029	41
	840																						

NOCTIDIURNAL SUCCESSION. TABLE I.

TYPE I.

In the natural year, and in the variable Julian Types of the Fasti.

NOCTIDIURNAL SUCCESSION. TABLE II.

TYPE II.

In the first Julian Type of the Fasti, supposed to be invariable.

HEBDOMADAL PERIOD IV. 896—56 years=840, A. M. 2633 to A. M. 3473. B. C. 1372 to B. C. 532.

	A			B	C		D			E		CC		DD			EE		F	G		H	I
Period	Sum of years	A. M.	B. C.			Feria	Mean Vernal Equinox	Feria	D. L.		Feria		Feria	Krion 1	Feria	D.L.		Feria	Feria	Cycles of seven days.	Feria	Sum of weeks.	
xxii	112	2633	1372	6	Apr. 3	7	Apr. 4	1	C	Jan. 3	1	Mar.13	7	Mar.14	1	C	Jan. 3	1	7	137,328		137,334	43
						6		7				12	6	13	7								
xxiii	140	2745	1260	6	Apr. 2	5	Apr. 3	6	D	Jan. 4	1	Mar.11	5	Mar.12	6	C	Jan. 3	1	5	143,171	5	143,178	45
						4		5				10	4	11	5								
xxiv	140	2885	1120	6	Apr. 1	3	Apr. 2	4	E	Jan. 5	1	Mar. 9	3	Mar.10	4	C	Jan. 3	1	3	150,476	3	150,483	47
						2		3				8	2	9	3								
xxv	112	3025	980	6	Mar.31	1	Apr. 1	2	F	Jan. 6	1	Mar. 7	1	Mar. 8	2	C	Jan. 3	1	1	157,781	1	157,788	49
						7		1				6	7	7	1								
xxvi	140	3137	868	6	Mar.30	6	Mar.31	7	G	Jan. 7	1	Mar. 5	6	Mar. 6	7	C	Jan. 3	1	6	163,624	6	163,632	51
						5		6				4	5	5	6								
xxvii	56	3277	728	6	Mar.29	4	Mar.30	5	A	Jan. 8	1	Mar. 3	4	Mar. 4	5	C	Jan. 3	1	4	170,929	4	170,937	53
						3		4				2	3	3	4								
												Mar. 1	2	Mar. 2	3	C							
						2		3				Feb. 28	2	Mar. 1	3	B	Jan. 2	1	2	173,851	2	173,859	55
												+27	27	+27	27					+	27	—	27
xxviii	140	3333	672	6	Mar.27	1	Mar.28	2	B	Jan. 9	1	Mar.27	1	Mar.28	2	B	Jan. 2	1	1	173,855	1	173,859	28
	840					7		1				26	7	27	1								

NOCTIDIURNAL SUCCESSION. Table I.

TYPE I.

In the natural year, and in the variable Julian Types of the Fasti.

NOCTIDIURNAL SUCCESSION. Table II.

TYPE II.

In the first Julian Type of the Fasti, supposed to be invariable.

Hebdomadal Period V. 896 years, A. M. 3473 to A. M. 4229. B. C. 532 to A. D. 225.

	A			B	C		D			E		CC		DD			EE		F	G		H	I
Period	Sum of years	A. M.	B. C.			Feria	Mean Vernal Equinox	Feria	D. L.		Feria		Feria	Krion I	Feria	D.L.		Feria	Feria	Cycles of seven days.	Feria	Sum of weeks	
xxix	112	3473	532	6	Mar. 26	6	Mar. 27	7	C	Jan. 3	I	Mar. 25	6	Mar. 26	7	B	Jan. 2	I	6	181,159	6	181,164	30
						5		6				24	5	25	6								
xxx	140	3585	420	6	Mar. 25	4	Mar. 26	5	D	Jan. 4	I	Mar. 23	4	Mar. 24	5	B	Jan. 2	I	4	187,003	4	187,008	32
						3		4				22	3	23	4								
xxxi	140	3725	280	6	Mar. 24	2	Mar. 25	3	E	Jan. 5	I	Mar. 21	2	Mar. 22	3	B	Jan. 2	I	2	194,308	2	194,313	34
						I		2				20	I	21	2								
xxxii	112	3865	140	6	Mar. 23	7	Mar. 24	I	F	Jan. 6	I	Mar. 19	7	Mar. 20	I	B	Jan. 2	I	7	201,613		201,618	36
						6		7				18	6	19	7								
xxxiii	140	3977	28	6	Mar. 22	5	Mar. 23	6	G	Jan. 7	I	Mar. 17	5	Mar. 18	6	B	Jan. 2	I	5	207,456	5	207,462	38
			A. D.			4		5				16	4	17	5								
xxxiv	112	4117	113	6	Mar. 21	3	Mar. 22	4	A	Jan. 8	I	Mar. 15	3	Mar. 16	4	B	Jan. 2	I	3	214,761	3	214,767	40
						2		3				14	2	15	3								
												Mar. 13	I	Mar. 14	2					220,605	I	220,611	42
												+7		+7						+	7		−7
xxxv	140	4229	225	6	Mar. 20	I	Mar. 21	2	B	Jan. 9	I	Mar. 20	I	Mar. 21	2	B	Jan. 2	I	I	220,606	I	220,611	35
	896					7		I															

NOCTIDIURNAL SUCCESSION. Table I.

TYPE I.

In the natural year, and in the Gregorian or variable Julian Types of the Fasti.

NOCTIDIURNAL SUCCESSION. Table II.

TYPE II.

In the Julian year, or first Type of the Fasti, supposed to be invariable.

Hebdomadal Period VI. 896 + 28 = 924 years, A. M. 4229 to A. M. 5153. A. D. 225 to A. D. 1149.

	A			B	C		D			E		CC		DD			EE		F	G		H	I
Period	Sum of years	A. M.	A. D.			Feria	Mean Vernal Equinox	Feria	D.L.		Feria		Feria	Krion 1	Feria	D.L.		Feria	Feria	Cycles of seven days.	Feria	Sum of weeks.	
xxxv	140	4229	225	6	Mar.20	1	Mar.21	2	B	Jan. 2	1	Mar.20	1	Mar.21	2	B	Jan. 2	1	1	220,606	1	220,611	35
xxxvi	140	4369	365	6	Mar.20	7	Mar.21	1	C	Jan. 3	1	Mar.19	7	Mar.20	1	B	Jan. 2	1	7	227,911		227,916	36
xxxvii	112	4509	505	6	Mar.20	6	Mar.21	7	D	Jan. 4	1	Mar.18	6	Mar.19	7	B	Jan. 2	1	6	235,215	6	235,221	37
xxxviii	140	4621	617	6	Mar.20	5	Mar.21	6	E	Jan. 5	1	Mar.17	5	Mar.18	6	B	Jan. 2	1	5	241,059	5	241,065	38
xxxix	112	4761	757	6	Mar.20	4	Mar.21	5	F	Jan. 6	1	Mar.16	4	Mar.17	5	B	Jan. 2	1	4	248,364	4	248,370	39
xl	140	4873	869	6	Mar.20	3	Mar.21	4	G	Jan. 7	1	Mar.15	3	Mar.16	4	B	Jan. 2	1	3	254,208	3	254,214	40
xli	140	5013	1009	6	Mar.20	2	Mar.21	3	A	Jan. 8	1	Mar.14	2	Mar.15	3	B	Jan. 2	1	2	261,513	2	261,519	41
	924																						

NOCTIDIURNAL SUCCESSION. Table I.

TYPE I.

In the natural year, and in the Gregorian or variable Julian Types of the Fasti.

NOCTIDIURNAL SUCCESSION. Table II.

TYPE II.

In the Julian year, or first Type of the Fasti, supposed to be invariable.

Hebdomadal Period VII. 896 years, A. M. 5153 to A. M. 6049. A. D. 1149 to A. D. 2045.

	A			B	C		D			E		CC		DD			EE		F	G		H	I
Period	Sum of years	A. M.	A. D.			Feria	Mean Vernal Equinox	Feria	D.L.		Eeria		Feria	Krion 1	Feria	D.L.		Feria	Feria	Cycles of seven days.	Feria	Sum of weeks	
xlii	112	5153	1149	6	Mar.20	1	Mar.21	2	B	Jan. 9	1	Mar.13	1	Mar.14	2	B	Jan.2	1	1	268,818	1	268,824	42
xlii	140	5265	1261	6	Mar.20	7	Mar.21	1	C	Jan.10	1	Mar.12	7	Mar.13	1	B	Jan.2	1	7	274,662		274,668	43
xliv	140	5405	1401	6	Mar.20	6	Mar.21	7	D	Jan.11	1	Mar.11	6	Mar.12	7	B	Jan.2	1	6	281,966	6	281,973	44
xlv	112	5545	1541	6	Mar.20	5	Mar.21	6	E	Jan.12	1	Mar.10	5	Mar.11	6	B	Jan.2	1	5	289,271	5	289,278	45
xxvi	140	5657	1653	6	Mar.20	4	Mar.21	5	F	Jan.13	1	Mar. 9	4	Mar.10	5	B	Jan.2	1	4	295,115	4	295,122	46
xlvii	112	5797	1793	6	Mar.20	3	Mar.21	4	G	Jan.14	1	Mar. 8	3	Mar. 9	4	B	Jan.2	1	3	302,420	3	302,427	47
xlviii	140	5909	1905	6	Mar.20	2	Mar.21	3	A	Jan.15	1	Mar. 7	2	Mar. 8	3	B	Jan.2	1	2	308,264	2	308,271	48
xlix	896	6049	2045	6	Mar.20	1	Mar.21	2	B	Jan.16	1	Mar. 6	1	Mar. 7	2	B	Jan.2	1	1	315,569	1	315,576	49

SECTION II.—*Explanation of Symbols.*

In Table I.

A. Julian periods of the Fasti, or length of time for which each of the Types of the Fasti serves its purpose; sometimes 112, sometimes 140, and in two instances 56, mean natural years, or actual Julian years: the former containing *four*, the second *five*, the third *two*, cycles of 28 years.

B. Hebdomadal epact at the end of each natural period as the same with the corresponding Julian one; or the number of noctidiurnal cycles = number of hebdomadal feriæ, remaining over and above the last complete week of the period. This is the same in each of our periods; and always = 6: because each natural period contains a complete number of weeks, and *six days* over; that is, one noctidiurnal cycle less than the number contained in the corresponding Julian period.

C. Noctidiurnal epoch at the beginning of each period in the natural year, in the cycle of feriæ; reckoned perpetually from the point of time from which the epact in the natural year begins to accumulate to an integral period of 24 hours of mean time: that is, from 24 hours before the mean Julian equinox, and, in the Julian reckoning of the noctidiurnal cycle, before the point of midnight; receding, as the scheme shews, down to A.D. 225, one number in the Julian notation, and two numbers in the order of feriæ, with every successive period.

D. Noctidiurnal epoch in the variable Julian type of the natural year, and in the cycle of feriæ, reckoned from the point of the mean vernal equinox and from the point of midnight at the beginning of each period; and receding one number in the Julian notation, two numbers in the order of feriæ, with every fresh period, down to A. D. 225, period xxxv.

DL. Dominical letter, hebdomadal character, or hebdomadal index, of the period, according to the circumstances of the

case; i. e. as the first integral cycle of night and day in the period, reckoned according to the Julian rule from midnight, (that is, the Julian date of the mean vernal equinox,) falls on the *first* day of the hebdomadal cycle, or on any other. The character of this first day in the first year of the period determines that of every other day in it; and the dominical letter of this first year is the hebdomadal index of the period, whether consisting of four cycles of 28 years = 112 years; or of five = 140; or of two = 56.

E. The first feria prima reckoned from midnight at the beginning of each of our periods, in January; the period being supposed in this case to bear date from January 1 at midnight; answering to the place in the order of feriæ of the mean Julian equinox at the beginning of each period also; and in seven successive periods, or in one hebdomadal period of 896 years, advancing from January 3 the feria prima to January 9 the feria prima, but no further; down to A. D. 225.

In Table II.

CC. Noctidiurnal succession in Type ii, answering to C in Type i.

DD. Noctidiurnal succession in Type ii, and succession of Julian equinoxes, or of what must be supposed the succession of Julian equinoxes, in Type ii, answering to D, in Type i.

DL. Dominical letter, hebdomadal character, or hebdomadal index, at the beginning of every Julian period in Type ii; which by hypothesis is invariable, and always the same as that at the beginning of the first period; and down to B. C. 672, period xxviii, is uniformly C; after B. C. 672 is always B.

EE. The first feria prima in January, reckoned from midnight, at the beginning of every period in Type ii as

reckoned from January 1 at midnight; answering consequently to E in Type i, but adapted to the hypothesis that the hebdomadal index of the period is always C or always B and April 25 or 24 is always the feria prima; and consequently January 3 or January 2 also.

F. Noctidiurnal epoch at the beginning of each natural period, (see C in Type i) as the same with the noctidiurnal epoch in the corresponding Julian (see CC) in Type ii; or that particular feria in the order of the hebdomadal cycle (considered as fixed and invariable) from which the hebdomadal succession in each period begins and proceeds in Type ii, as well as in Type i.

G. Sum of weeks, and parts of weeks, in the sense of cycles of sevens, in each Julian period in Type ii, from the proper noctidiurnal epoch defined by F at the beginning of one period, to the same defined by F at the beginning of the next, perpetually.

H. Sum of weeks in each Julian period in Type ii, from April 25 or 24, the feria prima, the original epoch of the whole succession, to April 25 or 24, perpetually: consisting consequently of entire weeks, without any epact or fraction.

I. Recession of CC, the noctidiurnal epoch in Type ii, on the primary hebdomadal and Julian epoch, or epoch of origination, April 25 or 24, the feria prima, at the beginning of every period. The addition of this recession to the Julian epoch of the period recovers the epoch of origination, April 25 or 24; and its addition to the feria of that epoch recovers the feria of origination, the feria prima, perpetually.

SECTION III.—*Remarks and observations on type i and type ii. The noctidiurnal and the hebdomadal succession in both types invariable.*

If there is any thing *in rerum natura* which may be pronounced invariable, it is the actual succession of night and

day and the actual succession of feriæ. This actual succession, so far as we know to the contrary, never has varied. The mean cycle has varied twice, but only twice; the actual never at all. In this respect the noctidiurnal succession and the hebdomadal may be styled the axis major of time; the immutability of which, amidst every thing mutable and fluctuating besides yet perpetually referrible to this, has kept and maintained every thing else too (relatively if not absolutely) the same all along; since it is impossible that things which have always preserved the same relation to this, or *vice versa* to which this has always stood in the same relation, even though they may have seemed in appearance to differ from each other, should ever have really differed.

The reader has only to run his eye either up or down the column of feriæ, attached to C and D in Type i., and to CC and DD in Type ii., to see that it is the same thing in each; and that, traced as it may be either downwards from A. M. 1 to A. M. 5909, B. C. 4004 to A. D. 1905, or upwards from A. M. 5909 to A. M. 1, A. D. 1905 to B. C. 4004, no hiatus is perceptible in the continuity of this cycle of feriæ, except once; viz. B. C. 672, of which more will be said by and by. It is the same cycle of sevens, constantly ending and constantly beginning again, in each case alike. The only difference is that, being followed downwards, it appears to go backwards perpetually, and when pursued upwards to go forwards perpetually. But this makes no difference to the continuity of the series either way. One essential and indispensable condition of the true succession, both of actual noctidiurnal and of actual hebdomadal time, viz. that it shall never be interrupted, never defective, never redundant, and shall never proceed except in one way and according to one law from first to last, is clearly observable in the above scheme.

It is in fact both a very curious and a very interesting study, to see with what truth and exactness, yet with what simplicity and clearness and conciseness, so long and so complicated a succession of things as that of the noctidiurnal in terms of the hebdomadal cycle perpetually admits of being represented in such a synopsis as this; so as to be taken in by the eye at one glance. In this entire scheme, which ex-

tends from A. M. 1 to A. M. 5909, B. C. 4004 to A. D. 1905, there are not fewer than 308,271 hebdomadal cycles, nor fewer than 2,157,897 noctidiurnal cycles; yet they are all summed up, and are all exhibited in their proper order of succession, in these 48 periods of Table i or Table ii.

The reason of this is that each of our Julian periods contains an even number of weeks; and each of our natural ones six days more than an even number of weeks. The succession of feriæ then through all our Julian periods is carried on, from the beginning of one to the beginning of another, simply by this number of weeks; and it is so in our natural periods through the epact of the last week remaining in each. The order of natural annual time, both in noctidiurnal and in hebdomadal, proceeds exactly from one period to another as it is represented in Table i; i. e. just as if there was only one week's interval, or only part of one week's interval, between the beginning of one and that of another perpetually.

The hebdomadal epact B at the end of each period serves as the link of connection in this respect; and as the means of descending from the first feria in one to the first feria in the next. This epact is always 6; and we have only to add it to the feria at the beginning of one period in C, and it gives us the feria at the beginning of the next in D (seven being first cast off from the sum if necessary); the diminution of which by unity gives the corresponding feria at the beginning of the same period in C.

This rule, it will be observed, holds good from the first down to A. D. 225. After A. D. 225, for a reason which will be explained hereafter, the addition of this constant of 6 in the column B to the first feria of the period in the column C gives the first noctidiurnal feria at the beginning of the next period in C at once; and its addition to the first feria at the beginning of one period in D gives the first at the beginning of the next in D at once also. In other words, and as a rule applicable to both these cases alike, having obtained in this manner the noctidiurnal epoch at the beginning of any period in D, we have nothing to do but to set it back 24 hours of mean time, and we shall obtain in like manner the noctidiurnal epoch at the beginning of the

same period in C: and this, as the inspection of the Tables shews, is a rule which holds good both before A. D. 225 and after it. And the noctidiurnal epoch in C, it should be remembered, is that of the succession of night and day in the natural cycle of annual time; the corresponding epoch in D is that of the similar succession in the Julian cycle of annual time corresponding to the natural in type i perpetually. But the question no doubt will be asked here, on what principle is this done? and why must the noctidiurnal epoch in natural annual time be set 24 hours of mean time behind the same thing in Julian? And as this question is really the most important which can be put in connection with this subject, we must endeavour to answer it as intelligibly and as satisfactorily as possible.

SECTION IV.—*On the necessity of the cycle of the leap day, and of the leap year, in natural annual time as much as in Julian.*

The mean natural year in itself is a distinct and independent measure of time. It is a measure *sui generis,* which admits of being compared with or reduced to nothing but itself. It is also finite and complete in itself. Every natural year must be regarded as a natural unit; incapable of decomposition or of resolution into parts. Each is the representative of the same absolute quantity of duration. It follows that every one such year is equal to another; and that the mean standard of this year, whatsoever it is in itself, is fixed and invariable. No such year can contain a moment of time more or a moment less than belongs to this standard. The mean Julian year is invariable also; but as a civil measure of annual time it has no actual existence. The actual Julian year on the contrary is not always the same with itself; but sometimes of 365 days in length, sometimes of 366. There is no such distinction as this of mean and actual in the natural year. There is no actual natural year of 365 days at one time and of 366 at another; nor any (according to the standard which we have assumed) which is either more or less than 365 d. 5 h. 48 m. 50 s. 24 th. perpetually.

It follows that in the natural cycle of mean annual time, considered in itself and measured by the interval between

the departure of the mean sun from any one of the cardinal points of the ecliptic and its return to it again, there can be no cycle of compensation by excess of mean time at one time for defect at another, or *vice versa;* that is, there can be no cycle of the leap day, as there is in the annual Julian. But when the natural annual cycle is referred to the noctidiurnal or to the hebdomadal, and every integral cycle of night and day which enters the former must enter the hebdomadal also, or make one in the constant succession of the noctidiurnal,—the state of the case is changed. Censorinus has spoken of the cycle of the leap year, even in the annual cycle in the sense of Julian, as a *naturale quadriennium* [a]; and in so speaking, he was nearer to the truth than very probably he himself was aware: for there is a cycle of leap year, which nature itself has established, even in the annual cycle as mixed up perpetually with the noctidiurnal and the hebdomadal; and that too a cycle of four years in this as much as in the Julian.

For though the mean natural cycle of annual time and the mean Julian cannot absolutely agree together even for a single year; yet so long as the difference between them does not yet amount to a night and a day, that is, to one period of 24 hours of mean solar time complete; no integral cycle of night and day, nor integral period of 24 hours, can enter into the Julian, which will not also either wholly or in part enter into the natural. And so long as this is the case, that is, so long as the actual difference between the mean natural and the mean Julian year does not yet amount to 24 hours of mean time complete, (which according to our own assumptions is for a limited period, not exceeding 140 nor less than 112 years of either kind,) it is allowable for merely conventional and civil purposes, (i. e. for the mere cyclical or calendar reckoning of annual time in terms of noctidiurnal, hebdomadal, or menstrual,) to suppose the mean natural year itself to be the same with the mean Julian, and the standard of the one to be that of the other; and therefore the epact of the mean natural to be the same with that of the mean Julian; and consequently the former to be six hours of mean time, or a fourth part of the entire

[a] De Die Natali, xviii. cf. xx.

period of twenty-four hours of mean time, as much as the latter.

Now it is self evident that in the constant numerical succession of the noctidiurnal cycle, as the same with the revolution of the earth about its own axis or with the period of 24 hours of mean time, nothing but integral cycles can possibly be taken into account; because there cannot be such a thing as an incomplete and imperfect cycle of the diurnal rotation, or an incomplete and imperfect cycle of the period of 24 hours as the measure of the diurnal rotation. No incomplete revolution of the earth about its own axis, no fractional part of the period of 24 hours, can possibly be taken into account in the constant numerical reckoning of either; nor consequently any incomplete cycle of night and day, either in itself, or as entering into the hebdomadal cycle or into the annual perpetually.

It follows that, before the epact at the end of the natural year can be taken into the account of the noctidiurnal cycle, or cycle of feriæ, as a part of each of those successions and of the annual all alike; it must first accumulate to one entire period of 24 hours: and if it amounts to a fourth part of that period, (as by hypothesis we are assuming that it does,) it cannot accumulate to one integral period of this kind in less than four years. But in four years it will accumulate to one such period; and by hypothesis to one such exactly. And if it is to be taken into the noctidiurnal succession in its proper place in the annual, as soon as it has so accumulated exactly, it would be as repugnant to the reason of things not to take it into account at this moment, as premature and even impossible to do so before. It follows that there must be a leap day, for this express purpose of receiving and representing the epact of the natural year in its proper place in the noctidiurnal, the hebdomadal, and the annual succession all at once, at the end of four natural years, as much as at the end of four Julian.

If this however is the case, and there must be a leap day, even in the noctidiurnal succession in the mean natural year, every four years, (a period of 24 hours, made up of four years' epact, which must be admitted into the common succession of noctidiurnal, hebdomadal, and annual time *extra*

ordinem, at the end of every four years,) it follows that the epoch of this period, the point of time from which the epact itself must begin to accumulate until it amounts to this period of 24 hours complete, must be set back to the distance of one such period exactly, *before* the proper epoch of the first such integral period itself in the natural year. There must be a margin in reserve of 24 hours of mean time exactly, within which the epact shall have scope to advance from 0 h. to 24 hours: so that, if the succession of natural annual time, including noctidiurnal and hebdomadal, is to be restricted and regulated by a particular rule, that of noctidiurnal in terms of annual must be regulated by another critically adapted to it.

We shall render our meaning more intelligible by considering the first instance of the kind which actually appears in our tables; the noctidiurnal succession in natural annual time as represented by C in period i, compared with the natural annual succession represented by D in period i also: the latter of which is fixed to the point of the mean vernal equinox at midnight, denoted by April 25 at midnight, B. C. 4004, the former to 24 hours of mean time earlier, April 24 at midnight also.

Let it be assumed then that the *first* integral cycle of night and day in the mean natural year, (and so far as the present argument is concerned, the first in the Julian type of the natural also,) was entering the noctidiurnal succession in the annual and in the hebdomadal at the point of midnight April 25, B. C. 4004. Then the *last* integral cycle in the natural year must have been bearing date April 24 at midnight, 24 hours before this. Yet *four* years before B. C. 4004, the first integral cycle in the natural year itself must have been bearing date April 24 at midnight also. Nor can any one doubt that the period of 24 hours of mean time, which measures the interval in this instance between midnight April 24 and midnight April 25, is the sum of four years' epact of the natural year; which B. C. 4008 amounted to 0 h, and in B. C. 4004 has accumulated to 24 hours; and having so accumulated, and attained thereby to the just measure of one noctidiurnal cycle, is now taking its proper place in the noctidiurnal, the hebdomadal, and the annual

succession all at once, as the last integral cycle of this kind in the natural annual cycle itself which both expired and began again at midnight April 25 B. C. 4004.*

We say then, (and this example is sufficient to prove the truth of the assertion,) that the proper epoch of the simple noctidiurnal succession in terms of the natural annual is 24 hours of mean time before the proper epoch or ingress of the natural annual cycle itself; and if this latter is always the point of the mean vernal equinox, (cyclically reckoned according to a positive rule from midnight perpetually,) the former must be 24 hours reckoned from midnight immediately before it; 24 hours before the point of the mean vernal equinox perpetually and at midnight, on the feria next before that of the mean vernal equinox itself, dated from midnight also. And this rule must be invariable. It must hold good under all circumstances; so long as the assumptions on which it is founded hold good likewise. Accordingly, it may be seen to be observed in our tables from first to last; and as much so after A. D. 225 as before.

The principle of the rule having thus been explained in one of the instances of its application, and that the first of all, it is unnecessary to explain it in any other; the principle of the explanation being the same in all. It may be objected however to this explanation, that it supposes the first actual commencement of time in these three measures, the noctidiurnal, the hebdomadal, and the annual, all in conjunction, to have been four years at least anterior to B. C. 4004; April 24 at midnight B. C. 4008, instead of April 25 at midnight B. C. 4004. And this is true. But it involves a question on which we have not yet entered formally, and which must still stand over for the present; though we hope to find an opportunity of considering it hereafter. And this is, Whether the actual commencement of time in all its

* The substance of what is thus said on this subject amounts to *this*: That so far as the noctidiurnal succession in the natural year is concerned, even the latter must be treated as made up of 365 noctidiurnal cycles every three years, and of 366 every fourth: and therefore that, if the epoch of the natural year itself at the beginning of the fifth year is supposed to be the point of midnight, that of the noctidiurnal succession in it must be midnight, 24 hours before.

measures in connection with human history, (that is, with the present system of things merely,) is the absolute commencement of time itself? For if not, then there is no weight in this objection, nor any inconsistency in the assumption on which we have proceeded. Had we selected our example from the second of our periods, the date of which is the mean vernal equinox and the feria sexta at midnight, (in the Julian notation April 24 at midnight,) A. M. 113, B. C. 3892, we might have escaped this objection at the present stage of our discussions; for no one could doubt that, in whatsoever way mundane time was going on A. M. 113, B. C. 3892, it must have been going on in the same way four years before.

SECTION V.—*On the continuity of the Julian succession of mean vernal equinoxes, and of Julian terms or exponents of the first feria in natural annual time, in type i.*

Again, the reader has only to follow with his eye the succession of D in Type i (Table i) down to A. D. 225, and that of DD in Type ii (Table ii) after A. D. 225, to see that, in the continuity of that succession in the Julian notation of its terms, there is no interruption from first to last. There is a regular series of Julian terms in Type i under D, down to A. D. 225, and in Type ii under DD, after that year; which, if traced downwards from A. M. 1 B. C. 4004, to A. M. 5909 A. D. 1905, descends and decreases continually by unity; and, if followed upwards from A. M. 5909 A. D. 1905 to A. M. 1 B. C. 4004, ascends and increases in like manner by unity continually; with one exception only in each instance, to which attention will be directed by and by.

Now this regular succession of Julian terms *communis generis*, both in D of Type i down to A. D. 225 and in DD of Type ii after it, is the succession of mean Julian equinoxes, and therefore of the same natural idea and natural term, which in its own nature is invariable; the first integral period of 24 hours, the first noctidiurnal cycle in the mean natural year, represented for the time being by a sign or exponent borrowed from the Julian calendar: for the sake of which representation too this natural idea or natural term itself is assumed to be conformed to the simple Julian idea,

and to the simple Julian expression of the idea, so far as always to consist of an integral period of 24 hours, and always to bear date from midnight. And though this assumption perpetually may appear to be contrary to the matter of fact, we have said enough to prove that for a limited number of years, (the duration of one of our Julian periods,) it is allowable; and at the beginning of each of these periods it is actually matter of fact, or may fairly be supposed to be so.

It follows that there is no interruption in the continuity of mean natural equinoxes, under their proper Julian exponents and representatives, either in Type i down to A. D. 225, or in Type ii after A. D. 225. It follows consequently that the beginning of the mean natural year is perpetually represented in these schemes in one and the same manner, and *that* the proper Julian manner of representing the same natural idea and natural term. The continuity of annual time then, both natural and civil, is as characteristic of this scheme as that of hebdomadal. The one is exhibited as simply and concisely yet as truly and as faithfully as the other. And yet there are 5908 mean natural years from A. M. 1 down to A. M. 5909; the first term of every one of which, as reckoned from the point of the mean vernal equinox and from the point of midnight, under its proper Julian denomination for the time being, may be said to be exhibited *seriatim* in these few periods: for the reader scarcely requires to be told that the first such term, under its proper Julian name, in the first year of one of these periods is the first of every other similarly expressed down to the end of the period itself.

It follows from all these things laid together that in these two Tables, as far as we have yet described and explained them, we have a correct representation both of the natural cycle of annual time, in conjunction with civil or Julian considered as the same with natural, and also of noctidiurnal and of hebdomadal time in conjunction with both, or of both as mixed up with noctidiurnal and hebdomadal perpetually.

SECTION VI.—*On the descent of the first term in the natural annual cycle in the order of feriæ, or the order of the hebdomadal cycle.*

The cycle of natural annual time being a different thing from the cycle of noctidiurnal, the epoch of the former must be a different thing in itself from that of the latter; nor can one of them be connected with the other, or one of them stand in a determinate relation to the other, except *per accidens,* or by virtue of a positive appointment *ab extra.* The matter of fact with respect to both is agreeable to this distinction; the epoch of the natural cycle of annual time being the mean vernal equinox, that of the noctidiurnal cycle, according to the Julian rule, being the point of midnight. And though there is no necessary connection between the mean vernal equinox and the point of midnight, yet there is one *de facto* and by appointment, according to the present system and constitution of things; by virtue of which the first mean vernal equinox, in connection with this system and for the proper meridian, coincided with the point of midnight; and consequently the natural cycle of annual time in connection with this system bearing date at the point of the mean vernal equinox and at midnight, the natural cycle of noctidiurnal, connected with it also and entering constantly into the annual from the first, must have borne date at the point of midnight, 24 hours before it.

The hebdomadal cycle being only a mode of the noctidiurnal, if hebdomadal time enters perpetually into annual, if it must be in and through noctidiurnal. The link of connection between the annual and the hebdomadal cycle is consequently the noctidiurnal; and in tracing the succession of either of these in terms of the other, we must first of all look at the succession of noctidiurnal in both; and see in what manner that must proceed perpetually in either separately, or in both in common. And in instituting this consideration the first thing to be noticed, and the most necessary to be borne in mind continually, is the fact which has just been established; viz. that the epoch of the noctidiurnal succession even in the annual, *de facto* and according to the established order and relations of the present system of things, is not

that of the natural annual cycle itself, but 24 hours before it; the epoch of the cycle of the leap day in the natural year itself, from which the epact of the natural year begins to accumulate, and continues to accumulate until it amounts to a perfect cycle of night and day.

Now were the mean natural year exactly equal to the mean Julian, 112 mean natural years would contain the same number of integral nights and days, (integral periods of 24 hours of mean time,) and the same number of cycles of these in sevens at a time, (that is weeks,) as 112 mean Julian years; i. e. 40,908 of the former, 5844 of the latter: and 140 mean natural years would contain the same number of each also, as 140 mean Julian; i. e. 51,135 of the former, 7305 of the latter. In this case, the first integral period of 24 hours, which entered the mean natural year at the beginning of one of our periods, at the point of the mean vernal equinox and at the point of midnight, on a certain feria of the hebdomadal cycle, reckoned from midnight also, (supposing this cycle perpetually the same with itself, and invariable in the number and order of its component parts,) would return to the same place again both in the natural cycle of annual time and in the hebdomadal cycle of noctidiurnal, at the beginning of the next; and even at the end of every 28 natural years. And this course and succession of things in each of these cycles, under such circumstances, it is manifest, would go on perpetually.

But in reality the number of integral periods of 24 hours, contained in 112 or in 140 mean natural years, is one less than that which is contained in 112 or in 140 mean Julian years. It follows that each of our periods of 112 mean natural years, reduced to weeks, must contain only 5843 perfect weeks, instead of 5844: and each of our periods of 140 mean natural years must contain only 7304 complete weeks, instead of 7305: but that there will also be in each of these cases an epact of six days, that is, of six hebdomadal feriæ, over and above the last complete week which enters every period. It follows from this fact, that a given period of 24 hours of mean time, (the first by hypothesis which enters the mean natural year at the beginning of one of our periods in its integrity, and consequently at the point of

the mean vernal equinox, and at the point of midnight on a given feria of the hebdomadal cycle, whether the first or any other, provided it be at the point of midnight also, according to the proper Julian rule,) will not return to the same feria, at the beginning of the next, at the same point of midnight, and in the same place in the order of these integral periods of 24 hours in the mean natural year; but at the earliest only to the feria, reckoned from the point of midnight, immediately before it.

And forasmuch as the proportion of the mean natural year to the mean Julian is invariable, and the order and succession of feriæ in the hebdomadal cycle is invariable also; the first inference which we may draw from both these facts is *this*: That the natural order of the noctidiurnal succession, (by which we mean the succession of periods of 24 hours of mean solar time,) in the annual and in the hebdomadal conjointly, the succession of integral periods of this kind as constituent parts of the annual cycle and of the hebdomadal also perpetually, contrary to what might have been supposed beforehand, is *retrograde*. The noctidiurnal succession, in the sense in which we have explained it, referred both to the natural annual and to the hebdomadal perpetually, must be continually falling back; that is, changing its epoch relatively to both, by receding from one period of 24 hours to another perpetually. It cannot stand still, and preserve one and the same relation to both these cycles at once, for more than one of our periods at a time; and when it moves at all, and changes its relation to both at once, it is not by advancing in the order of the hebdomadal cycle, but by receding. In order that the noctidiurnal succession may maintain one and the same relation perpetually to the annual, (the relation of the first period of 24 hours to the next, both dated alike from midnight, and one of them from the point of the mean vernal equinox, the other from the point of midnight immediately before it,) its epoch must be brought to one feria in the hebdomadal cycle after another, not by advancing from one to another, but by falling back from one to another perpetually.

The next thing to be observed is that this recession of the noctidiurnal succession, whereby it preserves its relation to

the annual unbroken in and among the feriæ of the hebdomadal succession also, cannot amount to less than one period of 24 hours in the former succession, or to less than one integral feria in the latter, at a time; because the difference between the epoch of the noctidiurnal succession and that of the annual can never be less than 24 hours. The question is, Whether it can or it ought ever to amount to more? in other words, Whether the recession of the noctidiurnal epoch, (which epoch preserves all along the same relation to the annual,) in and among the feriæ of the hebdomadal cycle, (which in themselves are fixed and at rest, and always preserve the same relation both to each other and to every thing else,) can never be less than one feria for every period, nor yet under any circumstances ever be more?

Now if we assume that it never can, or never ought to, be more than *one;* then having given the noctidiurnal epoch relatively to the annual at the beginning of any one of our periods, (for example the first,) and having given the hebdomadal feria with which it was coinciding at that point of time, we have nothing to do but to add the hebdomadal epact at the end of the period to this hebdomadal feria at the beginning; and we shall get the hebdomadal feria with which the noctidiurnal epoch, (still preserving the same relation to the annual,) must coincide at the beginning of the next.

Thus in the first instance of all, the noctidiurnal epoch fixed in the proper relation to the annual was April 24 at midnight, B.C. 4004, 24 hours before the point of the mean vernal equinox, (midnight also,) April 25 the same year: the hebdomadal feria with which it was coinciding was the feria septima at midnight. The epact at the end of the period is 6; (see B in Table i Type i;) and 6, the sum of this epact at the end, being added to 7, the feria of the beginning, and 7 being cast off from the sum of both, 13, the remainder, 6, is or ought to be the feria of the noctidiurnal epoch at the beginning of the second period; the feria on which April 23, the noctidiurnal epoch of the second period, analagous to April 24, that of the first, will or should be found to be entering, A.M. 113, B.C. 3892; only (according to the Julian rule) at midnight. And this rule, it is manifest,

upon this hypothesis must be uniform and invariable; so that having given the noctidiurnal epoch in its proper determinate state of relation to the annual, and the hebdomadal feria on which it was setting out in that state of relation, at the beginning of the very first of our periods, we could, by a very easy and yet an infallible process, find its proper hebdomadal feria in the same proper state of relation to the epoch of the natural annual cycle, under the same circumstances as at first, at the beginning of all our periods in succession.

Now the reader has merely to follow the course and succession of the noctidiurnal epoch, in this constant relation both to the natural annual cycle and to the hebdomadal, first in Type i under C, down to A. D. 225, and then in Type ii under CC, in order to perceive that this rule, which we have just been explaining, is actually that which begins to be observed, and to regulate the descent of the noctidiurnal epoch in the hebdomadal cycle, (its relation to the annual remaining all along the same,) after A. D. 225. Consequently after A. D. 225 there can be no doubt that this rule both must and does come into actual operation.

Now A. D. 225, as we have already asserted more than once, and as it will be fully proved we hope hereafter, is the true epoch of the actual Julian year; the actual point of time at which that complex or cycle of noctidiurnal time in the aggregate, which we call the Julian year, first came into existence, and from which it began to accompany the natural as a measure of noctidiurnal and of hebdomadal time perpetually, as well as the natural. The rule which determines the succession of the noctidiurnal epoch, in its proper relation to both these cycles of annual time and to hebdomadal also at once, is the necessary consequence of this change in the state of the case; and of the difference of the relations of this epoch to these different cycles until then. It is the rule prescribed by this change of relations itself. It is the only rule compatible with actual annual time, both natural and Julian, and actual hebdomadal and actual noctidiurnal (in the sense of the revolution of the same or similar periods of 24 hours), in each of those cycles continually and at once.

What then is the inference necessarily to be drawn from this fact? It is *this:* That if such be the law which must and does determine the succession of the noctidiurnal epoch, in its proper relation to annual, in and among the feriæ of the hebdomadal cycle, after A. D. 225; it cannot be the law which did determine and must have determined it before A. D. 225. The same law could not have governed the descent of C in Type i down to A. D. 225, which governs that of CC in Type ii after A. D. 225. It is impossible that it could have done so, and it is preposterous even to suppose it; since it would involve the absurdity of supposing the present Julian reckoning of annual time to have been in actual existence so long before its time, and the noctidiurnal succession, both in annual and in hebdomadal time, to have been as constantly referred from the first to that as to natural annual time.

It follows that the descent of the noctidiurnal epoch in the hebdomadal cycle, retaining its proper relation to the annual all along, must be regulated by a different law, in coming down to A. D. 225 with all these successions in conjunction, and after passing beyond that date. The explanation of this distinction is that, although we cannot, by any assumption of our own, make any form or type of annual time, in the sense of Julian, an actual one before its time; yet we must make use of some type of annual time, even in conjunction with natural, perpetually; and of a type which must be Julian too at all times, and in every respect except *this* one, of being actually the true Julian type of annual time in conjunction with natural, before its time. We must make use of a civil type of annual time, which shall not only thus be Julian perpetually in every respect but that one, but also shall be the nearest approach to the natural prototype of the same kind, which in the form of civil is possible. For this purpose however we must make use of a *series* of Julian types; since no one and the same type, in the nature of things, can remain perpetually the same with itself, yet perpetually retain the same relation to its natural prototype.

Now a series of variable Julian types, down to a certain point of time, allows of an hypothesis with respect to each, which with one and the same actual Julian type perpetually

would not be admissible; and that is *this:* That when the head of the natural year has receded through the whole of the last feria of one of these types, from the point of midnight to the point of midnight again, the first noctidiurnal term in this year, the first integral period of 24 hours which enters into it, cannot fall any longer upon this feria and in this type. Such a supposition as that with the actual Julian type would not be admissible, because it would be contrary to the matter of fact; as the succession of DD in type ii from A. D. 225 downwards shews. But with a proleptical Julian type, and with one which has already served its time, it is admissible; and it is the very thing which makes the difference between the proleptical Julian type and the actual, each standing for the time being in the same relation to the natural year.

Thus to begin with the first case of the kind which presents itself in our tables. The recession of the epoch or head of the mean natural year in the first of our Julian types, such as we exhibit perpetually in type i under D, begins on the feria prima at midnight, April 25 A. M. 1 B. C. 4004; and the feria immediately before this, the feria septima, occupied at this time by April 24 at midnight, is the last feria of this type.

At the end of 112 years, A.M. 113 B.C. 3892, the recession has attained to its maximum, and now amounts to 24 hours complete; consequently from midnight April 25 the feria prima, to midnight April 24 the feria septima. Now, with the actual Julian type, such as enters our tables in type ii DD, after A. D. 225, this interval, from the feria septima at midnight to the feria prima at midnight, under these circumstances would be competent to represent the first noctidiurnal cycle according to the Julian rule, the first integral period of 24 hours, in the mean natural year; and in fact it would represent it. But with a series of variable or proleptical Julian types, one of which at this moment has ceased to be an accurate measure of the mean natural year, and another which is such a measure is about to be substituted for it, this cannot be. The interval from the feria septima at midnight to the feria prima at midnight is competent to represent the *second* integral cycle of day and night in the

mean natural year at this point of time, but not the *first*. The point of midnight on the feria septima, at this moment, is not the *beginning* of the first noctidiurnal cycle in the natural year, but the *end*. The beginning of that cycle is the point of midnight on the feria sexta, just 24 hours before this. The feria septima in the last week of the Julian type which has accompanied the annual until now, the last feria of that type itself, has been totally and entirely evacuated by the first noctidiurnal cycle of the natural year; and it can no longer fall upon it under any circumstances or in any degree whatsoever as it did before.

It follows then that if the head of the natural year, and the first period of 24 hours in that year, at the beginning of the first of our periods was fixed to the feria 1ª at midnight; at the beginning of the second it must be found fixed to the feria 6ª at midnight: that is, it must be found to have dropt *two* numbers in the order of feriæ reckoned backwards, instead of *one*, in the course of one period. The noctidiurnal epoch, which by hypothesis and *de facto* preserves and must preserve the same relation to the head of the natural year, and to the integral noctidiurnal succession in that, must do the same; and consequently if it was 24 hours before midnight on the feria prima, at the ingress of the first period, it must be 24 hours before midnight on the feria sexta, at that of the second; that is, if it was the feria 7ª at midnight before, it will be the feria 5ª at midnight now. It follows that both the noctidiurnal epoch and the head of the mean natural year, down to A. D. 225, and while this constant succession of Julian types one after another is still going on, must drop two numbers in every period in the order of feriæ; the order of feriæ itself remaining unchanged and always the same. But in the Julian notation of this epoch and of this first noctidiurnal term in the natural year, which is in fact the mean natural equinox reckoned from midnight perpetually, there is no interruption; and it would be contrary to every principle of reason and analogy in the relations of type and antitype, that there should be: for there is no interruption in the noctidiurnal succession in the annual, or in the series of mean vernal equinoxes, from one of our periods to another; and therefore there ought to be none

in the constant Julian notation, and in the constant series of the Julian exponents, of either.

The technical rule consequently, by means of which we obtain the feriæ of C and D in type i down to A. D. 225, is by adding the epact 6, (in B) at the end of the period to the feria at the beginning; and (having cast off seven if necessary) by diminishing the remainder by unity. This gives the feria of C in type i, at the beginning of every period down to A. D. 225 perpetually. And as to the feria of D, it is evident that this addition of the epact 6 in B to the feria of C at the beginning of any one period gives the feria of D at the beginning of the next, at once. And D, it should be remembered, is that part of the scheme which represents the noctidiurnal succession in the annual, properly so called, perpetually; that is, it is the first integral noctidiurnal cycle in the natural year, dated both from the point of the vernal equinox and from that of midnight. In this succession there is no interruption through all our periods, either before A. D. 225 or after; either in itself or in its proper Julian representatives. It is manifest too, as we have repeatedly observed, that the order of feriæ under all these circumstances undergoes no change, but continues the same in itself and with respect to every thing else perpetually; and that no feria in the hebdomadal cycle, from the beginning to the end of our scheme, wants its proper occupant for the time being in the proper noctidiurnal succession in the natural year, and under its proper Julian name. Two feriæ in the order of this cycle are passed over from time to time by the noctidiurnal epoch in the natural year; and one feria is totally evacuated by the first noctidiurnal term in that succession. But this feria is still occupied by the second; and the complement of the cycle of feriæ is always full.

SECTION VII.—*On the descent of the epoch in C and D respectively, type i, (table i,) over* three *numbers in the order of feriæ, at the ingress of period xxviii, B. C.* 672.

These observations having been premised, nothing more it appears to us is required for the explanation of table i, type i, down to the ingress of period xxviii, A. M. 3333 B. C. 672, when the epoch in C drops *per saltum* from the feria

4ª to the feria 1ª, and that in D from the feria 5ª to the feria 2ª; and the corresponding Julian notation drops from March 29 to March 27 in the former instance, and from March 30 to March 28 in the latter.

But the explanation of this phenomenon too is simply that B. C. 672 is the point of time when the anomaly produced by the combined action of the two miracles took complete effect, and one actual cycle in the decursus of night and day became equal to two of mean; one actual feria in the hebdomadal cycle became equal to two mean feriæ; and one actual Julian term became nominally equivalent to itself and to the next to itself. It is manifest therefore that nothing takes place at this moment, either in C or in D, so far as the actual succession of feriæ is concerned, different from usual; and nothing more, so far as the mean is concerned, than the necessity of the case requires.

It is evident however that the feria, passed over in this instance *extra ordinem*, in the mean succession in C is the feria 2ª; and in D is the feria 3ª: and that the Julian term, passed over or merged in some other, in C is March 28, and in D is March 29: that the feria 2ª in C is absorbed in the feria 1ª, and the feria 3ª in D in the feria 2ª: and that March 27 in C becomes equivalent both to March 28 and 27, and March 28 in D to March 29 and March 28.

This effect, as we have already observed, has been permanent. It has been propagated through every Julian term in C later than March 27, and through every similar term in D later than March 28. At this moment consequently April 24, the epoch of the entire succession in C from the first, becomes virtually merged in April 23; and April 25, that of D, in April 24. And this entails a corresponding change in the hebdomadal index of both successions at first, both C and D, which at first was C and now becomes B, without any change of the feria of origination of the succession itself; April 24 when the index is B being the feria prima just as much as April 25 when the index is C. All this is sufficiently intelligible from the inspection of the schemes themselves.

It is manifest also that, if there is an apparent interruption at this time in the Julian notation of the noctidiurnal epoch

in C from period i previously down to period xxviii, and a similar interruption in that of mean vernal equinoxes in D; it is more in appearance in each instance than in reality. The noctidiurnal succession at the ingress of period xxviii in C is carried on by March 27 instead of March 28; but March 27, as we have already observed, is virtually now equivalent both to March 28 and to March 27 at once. That of mean Julian equinoxes in D is carried on in March 28 instead of March 29; but March 28 at this moment is virtually equivalent to March 29 and March 28 both together.

SECTION VIII.—*On type ii (table ii) in connection with, yet in contradistinction to, type i (table i.)*

The first observation, which requires to be made on type ii in comparison with type i, is that, though it appears at first sight to differ from it, it cannot be really distinct from it; as the constant inspection and collation of both will shew. The succession of feriæ in CC is perpetually the same as that of feriæ in C; and that in DD as that in D: which being the case, these different successions cannot really differ from each other; because things which continually agree with the same thing must constantly agree with each other. The order of feriæ is the same in both these types. It begins in both alike; and it runs through both alike. It is never changed or modified itself in any manner whatsoever. It must therefore make *one* of both these types perpetually.

Secondly, it is evident that each of these types sets out in a state of agreement with the other, both absolute and relative; that C and D in type i begin in the same manner as CC and DD in type ii; and that for the duration of the first of our periods, that is the first 112 years, they both proceed alike. And if there is no difference between April 24 the feria 7ª in C, or April 25 the feria 1ª in D, of type i, and April 24 the feria 7ª in CC and April 25 the feria 1ª in DD of type ii, at the beginning of this first period; there can or there ought to be none between April 23 the feria 5ª in C or April 24 the feria 6ª in D of type i, and April 22 the feria 5ª in CC or April 23 the feria 6ª in DD of type ii, at the beginning of the next; each of these latter terms at the beginning of this second period having been obtained exactly in the

same manner from each of the former at the beginning of the first. And what holds good of these parallel successions, C and CC D and DD, respectively, in the first and second periods, holds good in the second and third; and so on perpetually, *mutatis mutandis* merely. The characters of each at the beginning of successive periods are all obtained in the same manner from their respective characters at the beginning of the preceding period. In short the constant comparison of feriæ both in C and CC and in D and DD will shew that the march of the hebdomadal cycle from period to period perpetually is absolutely the same all through both these types; and therefore that every thing else perpetually compared with it in each, and to which it preserves the same relation continually, must be the same too.

Thirdly, the *prima facie* appearance of inconsistency between these types, (that is between C and CC and D and DD,) is due to the circumstance that we use a common nomenclature in both, and a nomenclature in both borrowed from the Julian calendar. Those however who have reflected that the Julian and the Gregorian calendar use a common nomenclature, and present at first sight the same appearance of difference one from the other without being in reality distinct, will not consider this circumstance of distinction externally any necessary proof of a real difference between these two types. Were we to agree to retain the Julian nomenclature in one of these types only, and to substitute something else for it, which was equivalent to it, in the other, what appearance of inconsistency would there be in that case even externally? For example, since the thing which we intend to denote perpetually under this Julian nomenclature in D is the first noctidiurnal cycle in the mean natural year, the simple, invariable natural idea and natural term which we call the mean vernal equinox, reckoned perpetually from the point of midnight, what objection would there be to our retaining the Julian notation for this natural idea and natural term in D, and substituting something else for it, which was only equivalent to it and intended of the same thing also, in DD? As for instance some such conventional symbol as Krion 1: the first of the celestial Krion, which must be the thing meant under every civil or positive denomination of

the mean vernal equinox whatsoever. Or what inconsistency would there be between the succession in D and that in DD, if, without disturbing the relation of either of these successions to the hebdomadal cycle or order of feriæ, we were to borrow from the ancient Roman calendar, or from any other calendar of antiquity which was Julian in principle, and had a conventional language and proper positive symbols of its own, the simple vernacular exponents of this natural idea and natural term of the mean vernal equinox, at the beginning of each of our periods; and were to substitute them for those of DD in type ii? The test or criterion of the constant identity of these types, and of D in particular in the one with DD in the other, which is thus suggested, is not hypothetical merely. It is one which is practically applied in the reduction of calendars of antiquity older than the Julian to the particular nomenclature of the Julian, as the common interpreter and common exponent of them all: but as it is much too important to be barely alluded to, and much too complicated to be fully discussed and illustrated in detail at present, we shall reserve it for a future opportunity.

Fourthly, the hypothesis on which this second type (table ii) sets out is that of the fixedness, and consequently of the perpetual applicability, of the first of our Julian types of the natural year. It is evident that, with such an assumption as this, we make the nearest approach to the realisation of such a matter of fact as that of the existence and use of the actual Julian year from the first, which could be made; for there can be no question that even the actual Julian year, carried proleptically back to the beginning of things, and supposed to have acquired an actual existence and actual use at that moment, in order to be an exact facsimile or representative of the actual natural year at the same point of time also, could not have assumed any form but that of the first of our Julian types. On the supposition then that this first of our Julian types had thus been constituted the actual type of actual annual time in the sense of Julian from the first, and had continued so ever after, the question is, what difference would that have made to the parallel succession in type i, table i?

We answer, To the best of our own apprehension, and of

our own judgment, none whatsoever. That succession must still have gone on in the same way. The only difference would have been, that the succession of type ii being by hypothesis purely and simply the Julian throughout, that in type i, in contradistinction to it, must have been all along purely and simply Gregorian. Now we have only to compare the actual succession of type i after A. D. 225, when it becomes purely Gregorian, with the parallel succession of type ii after A. D. 225 also, when it becomes purely Julian, to see that this must have been the relation which virtually subsisted between them from the first; the successions of type i and type ii after A.D. 225 being only the continuation of the same successions before, until then, respectively. The characteristic distinction between the Julian and the Gregorian reckoning at present is that the former falls back perpetually on the latter at the rate of one day in every period of our Fasti. We perceive that this is, *de facto*, the rate of the recession of CC on C, and of DD on D, after A. D. 225. The same thing holds good before A. D. 225 also: for we have only to compare C and CC and D and DD, through each of our periods from the first downwards, to see that each of the latter drops on each of the former one day for every period; so that at the end of the first period the difference between them is unity, and at the end of the 26th it is 26, and so on in proportion, continually.

In the actual Gregorian reckoning of noctidiurnal, hebdomadal, and annual time at present, in connection with the Julian, the common exponent of the epoch of all, which the Gregorian borrows from the Julian calendar, is apparently fixed in terms and stationary; while the Julian one corresponding to it, in comparison of it, is perpetually changing its name, if not its value; and is perpetually receding upon it. But the hebdomadal epoch of the Gregorian reckoning is not stationary; nor yet is it subject to any law of change or variation at present different from that which we exhibit in type i of our tables, both down to A. D. 225 and after it: and while that is the case, the Gregorian epoch may be nominally and in terms the same perpetually, but in reality it must be always changing its relation to the hebdomadal cycle of feriæ, which is the only thing in both our

types which remains absolutely fixed and immutable all along. In the succession of type i and type ii down to A. D. 225 one along with the other continually, the Julian exponents of the succession in the latter recede on those in the former, in a manner analogous to the recession of the Julian nomenclature on the Gregorian at present; but the former themselves are not stationary. They too are perpetually falling back on something else in exactly the same proportion as the Julian nomenclature in the one on the same nomenclature in the other: and this something it is evident is the first feria in the order of the hebdomadal cycle, from which both set out in common, the feria of origination which stood in the same relation to each of these successions at first. For it is manifest that the recession of C and D in the order of feriæ on the feria 7^a^ and the feria 1^a^, from which they set out at first, respectively, is precisely analogous to that of CC and DD in the order of the Julian nomenclature on April 24 and April 25, the proper Julian exponents of those two feriæ of origination at first, the former of the feria 7^a^, the latter of the feria 1^a^; viz. two numbers or two terms for every period down to A. D. 225. From which distinction we may draw this inference, That the succession in type i, in C and D, is the succession of noctidiurnal and hebdomadal in natural annual time, under its proper Julian nomenclature, perpetually; and that in type ii, in CC and DD, is that of noctidiurnal and hebdomadal simply in annual Julian, under the proper Julian nomenclature also. In the noctidiurnal and the hebdomadal succession *per se* there can be no interruption; and in the common notation of each, whether borrowed from the Julian calendar or from any other, there can be no interruption: for every noctidiurnal term and every hebdomadal term in such a succession must have its proper exponent and representative; and these must run on in the same order and sequence perpetually. This rule we observe holds good in type ii throughout. There is no interruption in that in the sequence of Julian terms, any more than in that of feriæ, from first to last. This succession is consequently simply that of the noctidiurnal and the hebdomadal in terms of the Julian calendar perpetually. But in the natural annual cycle, the succession of noctidiurnal

and hebdomadal time, as we have seen, does not run on without interruption; nor does every term in the latter find its place in the former under the same circumstances perpetually. There must therefore be interruptions in the continuity of both these latter as mixed up with the former continually; though there can be none in their continuity *per se*. The natural annual succession has its own noctidiurnal and its own hebdomadal succession perpetually; but it is not the same with the noctidiurnal and the hebdomadal *per se*. It makes use of the Julian notation too, for its own succession of each of these kinds; and an uninterrupted notation also: but if its own succession of each of these kinds is not that of the succession absolutely, neither can its proper notation of its own succession be the same with the proper notation of such a succession absolutely. For this reason the Julian notation in type i must necessarily differ from that in type ii: because in the former it is the Julian notation of the noctidiurnal cycle as it enters into both the natural annual and the hebdomadal perpetually; in the latter it is the Julian notation of the noctidiurnal cycle merely as it enters into the hebdomadal cycle perpetually. And these as we have seen are very different things in themselves. To this subject however we hope to recur again hereafter.

Section IX.—*On the descent of the epoch in CC and DD (type ii) through* three *numbers, B. C.* 672*: and on the first equation of the succession in CC and DD to that in C and D respectively.*

The succession in CC and DD being traced through the first 27 periods in type ii; it will not appear. that any thing more requires to be said concerning it, until we come to the ingress of period xxviii, B. C. 672: but at this point of time, it will be observed that the epoch in CC descends over three feriæ, from the feria 4ª to the feria 1ª, and that in DD over three also, from the feria 5ª to the feria 2ª; and that the Julian exponent of the epoch in CC drops three terms from March 3 to Feb. 28, and in DD drops three terms from March 4 to March 1.

This case is analogous to that which we have already explained in illustration of the succession in C and D of type i,

at the same point of time, respectively [d]. Nothing different from usual really takes place now in type ii any more than in type i. The truth is, that the Julian exponent in CC drops at this moment, according to the same law which regulated its descent before, from March 3 to March 1, and in DD from March 4 to March 2; but, by virtue of the change which now ensues in the actual value of the same nominal Julian term, Feb. 28 becomes equivalent to March 1, and March 1 is merged in Feb. 28; and in like manner March 1 becoming equivalent to March 2, March 2 is absorbed in March 1.

It follows that the proper feria of March 1 in CC at this point of time becomes that of Feb. 28, and that of March 2 the proper feria of March 1: consequently Feb. 28 at this moment B. C. 672 becomes the feria 2ª, and March 1 the feria 3ª. And this entails another change. For when Feb. 28 is the feria 2ª, and March 1 the feria 3ª, the hebdomadal index of the period and of the current year of the period is B. But before it was C; and had been so in this type at the beginning of every period from the first. From this time forward, for the same reason, it must be B in every period after the xxviiith; and virtually too in every period before it.

This point of time then, B. C. 672, the ingress of period xxviii, is the true epoch of the change in the primary date of origination, from which every thing in these two successions, CC and DD of type ii, has proceeded until now; from April 24 to April 23 in the former, and from April 25 to April 24 in the latter. The actual change which takes place B. C. 672 entails this virtual change even from the first, or from B. C. 4004. The hebdomadal index of the xxviiith period in type ii at this moment becoming B, that of every period before it becomes virtually B too; because every period in this type by hypothesis must have the same hebdomadal character, must begin and end on the same feria perpetually. But this entails no change in the feria of origination, either in CC or in DD. It affects only the Julian exponent of the feria. When B is the hebdomadal index, April 23 is the feria 7ª, just as much as April 24 when C is so: and April

[d] Section vii. p. 483.

24 is the feria 1[a] in this case just as much as April 25 in the other.

The chief thing however to be remarked at this moment is *this*: that C and D in type i being now compared with CC and DD respectively in type ii, the hebdomadal index in type i, by virtue of the regular law of the cycle of the Dominical letter in this type from the first until now, is perceived to be B, as much as that of type ii, which now becomes so by virtue of the change which has taken place at this moment in the regular law of that succession until now. This being the case, yet every thing else remaining in each type the same as before, it would make no difference to the relation of one of these types to the other in any other respect; it would not derange the succession of the noctidiurnal cycle in the hebdomadal in either; it would affect nothing but that which by hypothesis has differed all along in each, viz. the Julian notation of the same things in each respectively; if at this moment the Julian epoch of CC were to be advanced over 27 terms, from Feb. 28 the feria 2[a] to March 27 the feria 1[a]; and that of DD over as many from March 1 the feria 3[a] to March 28 the feria 2[a]. This being done, the succession of CC in this type it is evident would be equated to that of C in type i, and the succession of DD in type ii to that of D in type i, as completely as at first; and each of these successions would again set out in conjunction at the beginning of period xxviii, B. C. 672, in the same state of equality, both absolute and relative, in all respects as at the beginning of period i, B. C. 4004.

This addition of 27 however to the epochs of CC and of DD respectively in type ii, at this point of time, being a *bona fide* and not a nominal one, it is equivalent to so many days; and therefore it implies an addition of three weeks and six days to the sum of weeks in G, at the same point of time; and a diminution of 27 days in the amount of the precession in I. The former therefore now becomes 173,855, with an epact of 1, instead of 173,851, with an epact of 2: and the latter 28 instead of 55. This number of 28 however, added to March 27 in CC, will now bring us to April 24, just as much as 55 added to Feb. 28 would before; or just as much as 55 added to March 1 before would have brought us to April 25:

and 28 added to the feria of March 27 in CC still brings us to the feria of origination, the feria prima, just as much as 55 added to that of March 1 would have done before *.

SECTION X.—*On the second equation of the succession in CC and DD* (*type ii,*) *to that of C and D* (*type i,*) *at the ingress of period xxxv, A. D.* 225.

The two successions having thus been equated at the ingress of period xxviii, B. C. 672, they will proceed in conjunction, and go through the same cycle of changes as before after setting out in a state of equality at first, down to the epoch of the xxxvth period, A. M. 4229, A. D. 225.

At this point of time it will be seen that the hebdomadal index in type i, in obedience to the same law of change and succession which has regulated it all along, has again become B; while in type ii it has continued to be B ever since the ingress of period xxviii, in obedience to the law which regulates this index in that type too. It will be seen that the Julian epoch in C in type i is falling on March 20, and in CC in type ii is falling on March 13; but on the same feria, the feria prima, in each case; and that of D in type i is falling on March 21, that of DD in type ii is falling on March 14; but each on the same feria, the feria secunda, also.

There is therefore at this point of time a difference of seven Julian terms, seven noctidiurnal cycles, seven feriæ, between these several successions. It is possible therefore to equate the succession in CC to that in C, and the succession in DD to that in D, at this point of time, by just the same process as before, and without disturbing anything else now any more than before; viz. by merely advancing the

* The number of feriæ in type i, C, between the feria of C at the ingress of period xxviii, and the feria of origination at the beginning of period i, is the same as in type ii, CC, at the same point of time; though the former is represented by March 27, the latter by Feb. 28. In going back to the feria of origination from this feria in type i, C, we should advance two feriæ in the order of feriæ, and one number in the order of Julian terms, every period; but one number only in each, in doing the same in type ii, CC.

Julian notation in CC and DD seven terms, by adding one to the sum of weeks in G, and by diminishing the precession in I by seven. This being done, the epoch in CC is raised to March 20, the feria 1[a], absolutely the same as that of C; and the epoch of DD to March 21, the feria 2[a], at par with that of D.

Now this date A. D. 225, the ingress of period xxxv, as we have often observed, is the actual date of the actual Julian year at present in use, and virtually is that of the actual Gregorian one also; as we have shewn more at large in the general introduction to our tables [e]. It follows that, from this time forwards, the succession in CC and DD in type ii becomes that of the actual Julian calendar; and the succession in C and D in type i, virtually if not actually, becomes that of the Gregorian. Type ii at this moment, brought down as it has been from the first, passes into the actual Julian; and type i virtually into the actual Gregorian. And as each of these types sets out at this point of time in a state of absolute coincidence, one with the actual Julian the other with the actual Gregorian, they can never differ from them again; the Julian of type ii from the actual Julian under no circumstances, the Gregorian of type i from the actual Gregorian only *per accidens*, and to a limited extent and for a limited time; and that too merely because of the difference of rule in the administration of the Gregorian calendar of our Fasti and in that of the actual Gregorian. For the same reason neither can they differ again from each other, except only in the same manner and to the same extent as the actual Julian may differ from the actual Gregorian, or *vice versa;* which every one knows to be a difference only in appearance and not in reality. The Gregorian type of our tables, type i in table i, is still the true type of annual time in the sense of Julian, as perpetually equated to true annnal time in the sense of natural, such as this type i of table i has always been from the first; but the corresponding type of table ii is now the actual type of the succession of noctidiurnal and hebdomadal time in annual, in

[e] Introduction, part i. iii. sect. vii. The whole of this part should by all means be read along with this present chapter of our general work; and part ii. chapter iv. sect. i—ix. also.

the sense of natural as well as of Julian; which it has never been until now.

SECTION XI.—*On the explanation of the remainder of type i and of type ii in tables i and ii respectively.*

With regard to the remaining columns in either of these tables; it has been already explained that G is the sum of weeks and days, (or rather of cycles of seven days,) from the noctidiurnal epoch in CC at the beginning of one period to the noctidiurnal epoch at the beginning of the next. It is obtained by the constant addition of 5843 weeks, 5 days, when the period consists of 112 years; and by that of 7304 weeks, 5 days, when it consists of 140, down to A. D. 225. After that, by the addition of 5843 weeks, 6 days, or of 7304 weeks, 6 days. H is the sum of weeks, from the feria of origination in DD of type ii, (the feria prima,) to the same feria, (the feria prima,) perpetually, successively accumulated at the end of successive periods. The Julian exponent of this feria in this type is April 25 or 24 perpetually. This number of weeks is necessarily one of complete weeks. We obtain it by the constant addition of 5844 when the period consists of 112 years, and of 7305 when it consists of 140.

It is in fact the sum of Julian time in complete weeks, successively generated in our different periods from first to last: and, being multiplied by seven at the end of any period, it will give the corresponding number of nights and days up to the same point of time.

Thus at the ingress of period xlviii, A. M. 5909, A. D. 1905, according to the table, in H, the sum collected of weeks is 308,271; and multiplied by seven, in days and nights, it is 2,157,897.

The sum of mean Julian years in the same interval of time is 5908.

5000 mean Julian years	=	1,826,250	days.
900 ,, ,,		328,725	
8 ,, ,,	=	2,922	
5908 = ,, ,,		2,157,897	

Subtract 47 from this sum, and the remainder will be the interval, in actual Julian days and nights, between the first mean vernal equinox, April 24 at midnight, B. C. 4004, and

the 5909th, March 8 at midnight, A. D. 1905: and add unity to this remainder, and it will give the corresponding interval, in mean Julian days and nights, between April 25 and March 8[f].

No explanation is necessary for column E in type i, or column EE in type ii, except that before A. D. 225, we do not allow the Julian dates of these feriæ in January to ascend higher than Jan. 9: but after A. D. 225 we let them go on advancing to the end of the tables. They rise in fact after A. D. 225 on the primary epoch, or that at the ingress of period xxxv, Jan. 2, one day with every period; that is, with every correction of the Julian type of the annual cycle necessary to keep it constantly equated to the natural; or, (as it would be commonly considered and represented under such circum stances at present,) with every correction of the Gregorian type of our table in constant connection with the Julian. The number of such steps of the rise above Jan. 2, at the ingress of subsequent periods after the xxxvth, shews the difference of the Gregorian and of the Julian reckoning of our tables, at the given time. Thus, at the ingress of the xlvth period, in the course of which the actual Gregorian correction took its rise, this difference was 10 days, Jan. 12 in comparison of Jan. 2; and 10 days was the advance of the current reckoning of the Julian calendar at the time of the Gregorian correction, necessary to convert it into the Gregorian. At the ingress of period xlvii—which is still the current one of our tables—it had accumulated to 12; Jan. 14 instead of Jan. 2: and 12 is the difference of the Gregorian and of the Julian reckoning at present. It is what is meant at present by the difference between the new style of the calendar and the old.

SECTION XII. — *On the hebdomadal period of the natural year; or the period of the restitution of the same noctidiurnal term in the natural cycle of mean annual time to the same order in the cycle of feriæ.*

The most characteristic distinction between type i (table i) and type ii (table ii) is this; That in the former, both in C and in D, there is an uninterrupted succession of Julian

[f] See supra, p. 321.

exponents of the noctidiurnal succession in the natural year, but not in the order of feriæ; in the latter, in CC and DD, there is an uninterrupted succession of Julian exponents of the noctidiurnal succession in the order of feriæ, but not in the order of the natural year. The natural year finds a perpetual Julian notation in C and D for its first noctidiurnal term, and consequently for every other; the noctidiurnal succession finds a similar uninterrupted notation in CC and DD for every term of its own in the order of feriæ.

Now these are by no means the same things. The first noctidiurnal cycle in the natural year, and a given term in the order of feriæ, are by no means necessarily coincident. In fact they can never be coincident except for a limited time.

Chronologers, as we observed on a former occasion[g], have never sufficiently attended to the distinction that the civil year of every denomination, and whether solar or lunar, is only a larger and longer cycle of days. As such it does not differ *in genere* even from the hebdomadal cycle. The cycle of seven days therefore must enter every such year, as naturally as the cycle of night and day itself; and it must measure every such year more or less exactly at all times, and in the course of time even exactly; for there is no number of integral cycles of night and day greater than seven, in which seven will not be contained at last exactly.

The cycle of seven days measures the equable year in seven equable years; in which there are seven cycles of 365 days, and therefore 365 cycles of seven days, 365 weeks exactly. At the end of seven equable years every term in the annual cycle returns to the same order in the hebdomadal. The same cycle of seven days measures the actual Julian year, of 365 days every three years and of 366 every fourth, in 28 such years; in which there are 21 cycles of 365 days, and seven of 366, and 1461 weeks. In the course of this period therefore, which chronologers call the solar cycle, every noctidiurnal term in the Julian cycle of annual time runs through every combination with the feriæ of the hebdomadal, of which it is capable; and at the end of one such period the noctidiurnal succession returns to

[g] Diss. iii. ch. 1. sect. vi. p. 89.

the same relation both to the annual in the sense of Julian, and to the hebdomadal, in which it set out in each at the beginning of it.

The hebdomadal period therefore in the actual Julian year is neither more nor less than this cycle of 28 years. But the case is widely different with that of the mean natural year. The synoptical view of the course of the natural cycle of mean annual time in noctidiurnal and in hebdomadal, which we have proposed in these tables, demonstrates that when a given term in the mean natural year has once ceased to fall on a given feria in the order of the hebdomadal cycle, under given circumstances, such as are always implied in the constant application of this period of 28 years whether to the mean natural or to the mean or the actual Julian year; it cannot begin to fall upon it again, under the same circumstances of relation to that period as before, in less than 896 mean natural years and 32 periods of 28 years. Nature has prescribed this law; and not any arrangements of ours. It is a fixed and invariable law. It holds good after A. D. 225, as much as before. The only difference in the state of the case, before and after this point of time respectively, is that before A. D. 225 the return of the same natural term to the same hebdomadal feria in the same year of the period of 28 years perpetually is effected by its dropping two numbers in the order of feriæ; and after A. D. 225 by its dropping one. But the length of time taken up by the process, the period of the return or the restitution itself, is the same in either case, 896 mean natural years.

If we corrected our calendar every 128 years, this period would be one of 128×7 or 896 years perpetually; and the entire number of the steps of descent through the cycle of feriæ in each of these periods, before A. D. 225, would be 14; and after A. D. 225 would be 7. If we corrected it every 129 years, it is manifest we should get a period of $129 \times 7 \times 4$ or 3612 years; in which the number of steps of descent between A. M. 1, B. C. 4004 and A. M. 3613, B. C. 392 would be 28×2 or 56: and after A. M. 4229 A. D. 225 would be 28. A period of this magnitude however could be renewed only once in 6000 natural years. If the reader will turn to A. M. 3613 B. C. 392 in our general tables, he will see that what

we have asserted actually holds good: only that, as we actually correct our calendar in these 3612 years 29 times, instead of 28, the actual number of the steps of descent of the first noctidiurnal term in the natural year, in the order of feriæ, is 29×2 or 58, *secundum ordinem*, and one more, *extra ordinem*, for B. C. 672: that is, 59 in all = 8 cycles of seven, and three feriæ over of a ninth. Consequently, if the feria of origination A. M. 1 was the feria 1[a], the feria of the epoch, A. M. 3613 B. C. 392, should be the feria 5[a]. And as the first noctidiurnal term in the mean natural year, the Julian equinox, A. M. 3613 B. C. 392, was March 26, and the Dominical letter of the year was D, it is manifest that March 26 must have been the feria 5[a]—or Thursday. Yet even this period, great as it is, does not bring the first noctidiurnal term in the natural year in this instance back to the feria of origination in the first year of a cycle of 28 years, viz. the feria prima, but to the feria quinta.

The substance of what we have had to say in illustration of these subjects amounts to this: That an uninterrupted Julian notation of natural terms, in the sense of noctidiurnal cycles which enter integrally and successively into the natural year, and an uninterrupted Julian notation of hebdomadal terms, that is of noctidiurnal cycles entering integrally and successively into the cycle of feriæ, before A. D. 225, are not capable of consisting together. And if the former of these is more essential and more indispensable to the equation of annual time, in the sense of Julian, to annual in the sense of natural, than the latter; it is clear that the latter must give way to the former. It is clear then that down to A. D. 225 the Julian succession even of the noctidiurnal cycle in the annual and in the hebdomadal must be carried on in Type i Table i perpetually, not in Type ii Table ii. But after A. D. 225 both these things begin to be possible, or rather both to be actual; viz. a Julian notation of natural terms in the sense explained above, and a Julian notation of feriæ, each standing in the same relation to the other, and to its proper succession perpetually. From this time forward the noctidiurnal succession runs on in the annual of both kinds, and in the hebdomadal, alike: and the same Julian notation serves for it in both alike. Not that the natural

year in comparison of the Julian becomes any thing different after A. D. 225 from what it was before; but because, while there was yet no such thing as the actual Julian year, the standard of reference, even for the noctidiurnal succession in that form of the Julian year of which we do make use, is after all the noctidiurnal succession in the natural. The noctidiurnal and hebdomadal reckoning even in the Julian year down to A. D. 225 is kept in terms of the natural; after A. D. 225 it is kept in terms of both, as proceeding *de facto* at once and *pari passu* in both.

With respect however to the case of calendars, nominally indeed distinct from the Julian but in many instances the same in principle with it, and in every case of the kind agreeing with the Julian in being merely such and such complexes or cycles of the noctidiurnal succession perpetually; it cannot be doubted that there was a great multitude of that description, which had an actual existence in one form or another long before the actual Julian year itself came into being. The question may be asked, In what manner the actual succession of noctidiurnal time went on in these along with the actual succession of the same thing in the mean natural year? This is a question which we propose to answer, by the production of cases in point, in the next chapter. It is easy to see however that such a combination of two actual successions of the same thing at the same time as this must be effected by the fusion together or amalgamation of our two types, Type i and Type ii, in some manner or other; and we might almost venture to predict that, in such an amalgamation of actual natural with actual calendar time as this, the succession of natural equinoxes in such calendars must still follow the law of D in Type i, and therefore the noctidiurnal succession in some manner or other must follow the law of CC in Type ii. But on this point we shall better be able to judge after we have instituted the review which we are proposing.

CHAPTER V.

Synopsis of the course and succession of the noctidiurnal cycle in the hebdomadal, the nundinal, and the sexagesimal cycle conjointly.

SECTION I.—*The hebdomadal only one among other possible measures of the noctidiurnal succession by any number greater than unity.*

IT is not essential to the measurement of the cycle of night and day by some division of the same kind of cycle greater than unity, that it should be limited to any one number of nights and days at a time more than to another. The history of the noctidiurnal succession, as we have seen, brings various cycles of this kind to light; each of them contrived for the same purpose, and each of them applied to its proper purpose in a similar manner. The hebdomadal cycle is one of seven; others have been some greater some less than seven: but as measures of the constant succession of night and day they have all answered the same end, and in a similar manner, while they have been in use.

The peculiar distinction of the hebdomadal division of this kind resides in the fact That the hebdomadal cycle was the appointment of the Author of time itself: all other and similar cycles have been devised and instituted by men. The hebdomadal cycle is possibly older than mundane time; it has at least existed from the beginning of mundane time: all others are comparatively of recent date, are incomparably later in their origin than this. The hebdomadal cycle as a measure of the noctidiurnal succession has served the same purpose perpetually; none other has done so besides: many have been used for a time, none every where or without interruption, but the hebdomadal. Many, in ancient times, might boast of a prescription of long standing; and some may do so still, and even more truly at present than ever before. None can appeal to a prescription like that of the hebdomadal cycle; none can lay claim to an antiquity equal to that of this; none can produce the proofs and vouchers of

an uninterrupted use and observance from the very beginning of human history, but this—the most patriarchal, the best attested, the most authentic, and on every account the most venerable, of all.

SECTION II.—*On the Nundinal cycle of Ancient Italy, and on the Sexagesimal cycle of Modern China.*

Two cycles of this kind however there are, which have been more than once adverted to already, though nothing has yet been said in illustration of either in particular; two cycles *communis generis* even with the hebdomadal; and, if any thing of merely human contrivance were proper to be compared with that which was confessedly of divine institution, two the most deserving to be contrasted with the hebdomadal itself; the NUNDINAL cycle of Ancient Italy, and the SEXAGESIMAL cycle of Ancient and of Modern China.

The classical associations connected with the nundinal cycle, and its peculiar relation to the Roman calendar from which even our own is derived, make the nundinal cycle a subject of interest and an object of curiosity even to ourselves at present. This cycle was distinct in its origin from the Roman calendar, yet it entered it from the first; and through all the changes and modifications which that calendar underwent, this cycle was interwoven with its texture by a perpetual thread, never once interrupted or broken from the time of Romulus to that of Julius Cæsar; nor even long after that.

The sexagesimal cycle of the Chinese also is indissolubly connected with their present calendar. It came into being along with it, and it has never been separated from it. It has been confirmed and consecrated by time as much as the calendar itself; and though its origin was much later than that of the nundinal, it has long survived the nundinal; and it may lay claim to an antiquity at present of which the nundinal never could boast, and which no similar cycle can now surpass except the hebdomadal.

We persuade ourselves therefore that we shall not be rendering an unacceptable service to our readers, if we lay before them in one tabular view the course and succession of this *one* thing; viz. the noctidiurnal cycle, in the sense of

the period of 24 hours of mean solar time perpetually, in each of these famous cycles, the hebdomadal, the nundinal, and the sexagesimal, from the time when they began to proceed all three in conjunction, and so long as they continued or have continued to proceed in conjunction; which in the case of the hebdomadal and of the sexagesimal is in fact down to the present day.

This synopsis will come in to promote the general argument of this part of our work, the illustration and confirmation of the true theory of the course of noctidiurnal in hebdomadal and in annual time perpetually: the principle of that succession being just the same in one of these cases as in another. It will also supply the only desideratum necessary to complete the details of the preceding chapter; by shewing in two actual examples of the kind the proper relation of a fixed Julian type of the noctidiurnal succession in annual, (like that of Type ii in Table ii *supra,*) older than the actual existence of any such type in the shape of the Julian at present in use, to the variable Julian type of the same thing exhibited in Type i Table i, which is all along the true type and exemplar of the noctidiurnal succession in terms of the Julian calendar, in constant connection with the natural annual as well as with the hebdomadal; or at least down to the time of the actual introduction into use of the actual Julian calendar itself: a relation to which we briefly adverted in the last chapter[i], but the particular consideration of which we proposed to reserve for a future opportunity.

First however we must premise some account of the history of each of these cycles; though, for obvious reasons, only of the briefest and the most general kind at present.

SECTION III.—*History of the Nundinal cycle.*

The most correct and exact representation of the *orbis nundinalis,* or nundinal cycle, of antiquity, (as we hope to demonstrate hereafter,) is *this:* That it was a constant succession of the cycle of night and day in periods of *eight* such cycles at a time; and that in this *orbis* or cycle the nundinal day itself was always the first, just as the Lord's day or Sunday is in the hebdomadal cycle of Christians. Or to state this

[i] p. 487.

proposition a little differently; eight days being reckoned perpetually from one nundinal day to another, the *eighth* was always the nundinal day.

Such was always the actual rule of the reckoning; though from the idiomatic (if not the ambiguous) language in which it is sometimes represented, it might be supposed it was a cycle of *nine* days, or even a cycle of *seven* days. It does not appear that this reckoning ever varied. Indeed from the comparison of the cycle with itself at every period of its continuing use, we may safely venture to say it never could have varied from first to last. But whether every day of the cycle was reckoned at first from midnight, or according to the primitive rule, is another question. We may assume that among the Romans in particular, from the time of Numa downwards, the former might be the case; though such an assumption is by no means necessary.

It appears further that this particular measure of the nundinal cycle was pitched upon because the *orbis nundinalis* itself was a cycle of lunar phases, as well as a cycle of night and day. The calendar into which it entered from the first was a lunar calendar, though lunar *sui generis;* a calendar of half or of quarter lunations, not of entire lunations. The mean or civil standard of the lunar month, assumed in this calendar, was one of 32 days; and the corresponding standard of the quarter lunation was one of eight days. Into the civil lunar year so contrived *nine* lunations of the standard assumed, and half of a *tenth,* entered perpetually; that is, 38 quarter lunations or cycles of eight days merely. The reader must be content with this summary statement of the simple matter of fact, at present. It would manifestly be improper to anticipate those particular explanations which are to be reserved for the illustration of the Roman calendar.

The first and oldest form of this nundinal calendar, of which we have been able to discover any traces, is found to have taken its rise on the first day of the primitive Thoth, Æra cyclica 2907, May 22, B. C. 1100; and it is not a little remarkable that the *first* day of the *first* nundinal cycle, as coming into being at that time, coincided with the *second* day of the current hebdomadal cycle: for both Thoth 1 Æra cyclica 2907 and May 22 B. C. 1100 were the second day of

the week. The proper epoch of a cycle like the nundinal, in terms of the hebdomadal, *a priori* would seem to be either the *first* term of the hebdomadal or the *second.*

Be this as it may, the nundinal cycle came into existence at this time, and in this state of actual relation to the hebdomadal; and it appears to have taken its rise if not at Alba Longa, (which we consider to be most probable,) yet among the Aborigines of Italy, the Prisci Latini, the Socii nominis Latini, as they were styled by the Romans in after times: and we have it in our power to trace the identical cycle, which came into existence in this quarter and at this time, among the very same communities down to the time of Censorinus.

Two hundred and forty years after this introduction into ancient Italy of the *first* and original form of the nundinal calendar, we meet with a *second;* which came into existence among the Hetrurians in particular on the first of the primitive Thoth Æra cyclica 3147, March 25 B.C. 860; both which in that year fell on the *feria quarta,* or *middle* day of the current hebdomadal cycle: and this too is another remarkable coincidence. For in choosing the proper epoch of a new cycle of eight days, in terms of an old cycle of seven days, if one day in the latter was not more to be fixed on *a priori* than another, what would seem so fit to be selected as the middle one of all?

The nundinal cycle of this second form was absolutely the same *ab initio* as that of the first; Thoth 1, Æra cyclica 3147, being nundinal alike in each. There can be no question then that even this second is ultimately resolvable into the first. Yet it does not appear that the ancient Hetrurians in particular had thought of adopting the orbis nundinalis until now; and the calendar which came into being, attached to this epoch of Thoth 1, Æra cyclica 3147, March 25 B.C. 860, must be considered peculiar to them.

And there is this further circumstance of distinction to render it peculiarly theirs, and to vindicate the right and title of the ancient Hetrurians in particular to this second form of the same nundinal calendar in general; viz. That the doctrine and division of *sæcula,* so characteristic of ancient Hetruria, came into being along with it also. The first of

the Etruscan sæcula too is attached to this date of Thoth 1 Æra Cyclica 3147, March 25 B.C. 860: and we have it in our power to trace the entire succession of such sæcula from this time down to that of Censorinus.

In confirmation however of such a connection between this nundinal correction of the Hetrurians and this Etruscan division of secular periods, we will mention only one fact at present: viz. That the nundinal calendar of Romulus was borrowed from this Etruscan one, and the city of Rome was founded by Romulus, at the same point of time, the *end* of one of these sæcula, and that too the first which had actually elapsed from the epoch of the Hetrurian correction. The force of this coincidence will be appreciated when it is understood that the measure of this secular period was 110 years; and that this measure itself was supposed to be prescribed by the destiny and duration of cities, as fatally linked with the term of human existence also in its utmost possible extent. We hope to explain this connection more particularly in its proper place. Suffice it at present to inform the reader, that the date of the introduction both of this doctrine and of the Hetrurian correction was B. C. 860; that of the foundation of Rome and of the correction of Romulus was B. C. 750, just one secular period of 110 years later.

The next form or type of the nundinal calendar which meets us is the correction of the Hetrurian by Romulus. The calendar of Romulus was nundinal; and the orbis nundinalis of that calendar was absolutely identical both with the nundinal cycle of the first type, (the cycle of Alba Longa, and of the Prisci Latini or Aborigines,) in his own time, and with that of the second type, (the cycle of the Hetrurians,) of his own time also. Yet the calendar of Romulus was his own; and it cannot be more justly described than as a correction of that of the Hetrurians. It borrowed its *epoch* from this; its nundinal cycle not only from this, but also from the much older cycle of the same kind, the nundinal cycle of primitive antiquity in Italy. Yet the names and the lengths of the months, the details and administration of the calendar, so far as we know to the contrary, were peculiar to it. Its epoch was the Kalends of March in the true Urban notation, U. C. 1, in that of Varro, U. C. 4: in

either case, Feb. 4 B. C. 750; a nundinal day, in every form of the nundinal calendar concerning which we have reason to believe that it was actually in existence at the time, but the *first* such day in the current nundinal year, only in the Hetrurian calendar.

Thirty eight years after the institution of this calendar at Rome, (i. e. B. C. 712,) it was superseded by the correction of Numa Pompilius, a lunar calendar as much as the nundinal, but one of a different kind; and in this instance virtually the same as the octaëteris, and differing from it actually only in the length of the cycle, and in its administration and details through successive years of the cycle. Yet the nundinal cycle was incorporated with this correction from the first; and as so incorporated was taken directly from the calendar of Romulus. The link of connection between the calendar of Romulus before in use, and this correction of Numa which was now taking its place, was the nundinal cycle, and nothing else. The first kalends of January in this correction were borrowed from the first of the primitive Thoth Æra cyclica 3295, Feb. 17 B. C. 712. The first nundinal cycle was the first in the calendar of Romulus, later than the kalends of January or epoch, in that of Numa, the nones of January, U. C. 39=42, Feb. 21 B. C. 712. And this nundinal day too in that year fell on the second day of the current hebdomadal cycle; as the first nundinal day of all, May 22, B. C. 1100, had done.

It follows that the proper epoch of the orbis nundinalis in the calendar of Numa was the nones of January, U. C. 39=42, Feb. 21, B. C. 712. From this point of time we are able to trace it without interruption down to the date of the Decemviral correction of the Pompilian calendar, and to the first nundinal date in that too; which also turns out to be the nones of January, U. C. 303=306, January 2, B. C. 448: and from that to the first similar date in the first year of the *Kalendarium vagum,* the irregular Roman calendar, vi Idus Januarias U. C. 544=547, Jan. 17, B. C. 207: and from thence to the first nundinal date in the first year of the Julian æra itself, the kalends of January, U. C. 706=709, Dec. 30, B. C. 46: and finally as low down even as the first nundinal date in the 400th Julian year, the kalends of January

again, U. C. 1105 = 1108, Jan. 1, A. D. 355: lower than which it would scarcely be worth our while to attempt to investigate it, even if the attempt were feasible; but below which it is much to be questioned whether the means of investigating it are any where in existence at present.

SECTION IV.—*History of the Sexagesimal cycle.*

The Chinese have a sexagesimal cycle of years, as well as one of days. Both too came into existence and into use at once. We are concerned at present only with the latter; the cycle of 60 days.

Whatsoever the Chinese themselves may pretend to the contrary, and whatsoever the too great credulity of learned men among the moderns may have induced them to believe; yet on a searching inquiry into the history of the Chinese calendar, into its true character and constitution not only at present but in former times, it turns out, (as it might have been expected *a priori* it would,) that this singular people, who have been so tenacious of their ancient customs in all other respects, really made no change in the oldest institution of the kind among them or any where else, the primitive civil calendar inherited by them in common with the rest of mankind, before Æra cyclica 3265, Nab. 6, B. C. 742 at least: when they incorporated with this primitive solar calendar the lunar calendar which nature itself had associated with it; viz. the Apis calendar; fixing its epoch to the 2d day of the primitive Thoth, Æra cyc. 3265 Nabon. 6, Feb. 25, B. C. 742.

Along with this Apis cycle they introduced also for the first time the sexagesimal division of the noctidiurnal succession; that is, the cycle of 60 days: but because that division was more properly adapted to a year of 360 days than to one of 365, and because the last complete cycle of 60 days in the year of 365 days must necessarily expire on the 30th of Mesore, they fixed the epoch of the cycle, in the first instance of all, not to the first or to the second of Thoth, Æra cyc. 3265 Nabon. 6, Feb. 24 or 25 B. C. 742, but to the day after Mesore 30, Epagomene 1 Æra cyc. 3264 Nab. 5, Feb. 19 B. C. 742. The lunar and the sexagesimal dates which appear in the *Tchun-tsieou* of Confucius, and are the oldest

examples of the kind which Chinese antiquity has to exhibit, are those of this Apis cycle and of this sexagesimal cycle, now introduced one in conjunction with the other: and, as we have already observed [a], both are to be explained and verified, if at all, by means of these two cycles only.

The Apis cycle and the sexagesimal of this date appear to have gone on unchanged in China from Æra cyclica 3265 Nab. 6, B. C. 742, to Æra cyclica 3350 Nab. 91, B. C. 657: but in this year, (whether in the same part of China, or even every where in China at the same time, or not,) the lunar calendar, which is still in use in that country, and the cycle of 60 days, and the cycle of 60 years, both which also are still in use, appear to have taken their rise in China at once. It is certain at least that all have been in existence in that country together ever since this year B. C. 657.

The lunar calendar which came into existence at this time, (and which is still in existence in China, though not attached to the same epoch at present as at first,) whether it is formally to be called Metonic or not, is to all intents and purposes a calendar of that description. It has a cycle of 19 years; and always has had. Now the solar calendar, to which the lunar calendar in the form of Metonic is necessarily adapted, is the mean Julian. The solar calendar in use in China, before this date of B. C. 657, was the equable or primitive. A great change then was undoubtedly made, both in the external appearance and in the actual constitution of the civil calendar in China, at this time, if the primitive solar calendar was now superseded by the Julian, and the Apis cycle by the Metonic. Yet that the new calendar was not independent of the old in either capacity is proved by the fact, that the epoch of the Metonic correction itself was borrowed from that of the Apis calendar for the time being; which was the same thing as taking it from the primitive solar year: the first of the fifth month in the 11th year of the fourth Apis cycle, Thoth 13, Nabon. 91, Feb. 16, B. C. 657, being constituted the epoch both of the new lunar calendar and of the lunæsolar cycle of 19 years by which it was destined to be thenceforwards regulated, and by which it has

[a] Supra, p. 365–367.

been actually regulated, if not nominally yet virtually, ever since.

Now the sexagesimal character or feria of this Julian term Feb. 16, B. C. 657, according to the cycle previously in use, was the 22d: but as that was evidently not adapted *a priori* to serve as the epoch of such a reckoning of 60 days perpetually in conjunction with a lunar of 30 or of 29, it appears to have been considered necessary at the time to treat this 22d sexagesimal feria as if it had been the 30th; that is, to raise it in the nominal order of feriæ in that cycle eight days or eight terms *per saltum* at once.

The proper epoch then of the sexagesimal reckoning of feriæ, in connection with this new lunar calendar among the Chinese, was purposely attached to the 30th feria of the cycle; so that between the reckoning according to the old cycle, and that of the new, there was a nominal difference of eight *feriæ*, even from the first; though it must be manifest, under such circumstances, that the difference would be only nominal, not real, and something like the difference of old style and new style, or of the Julian and the Gregorian reckoning of the same thing, at present*. The same third term, Feb. 16, B. C. 657, was the 22d in the order of one cycle, and the 30th in that of the other, both at once. And Feb. 16, the actual epoch of the new lunar calendar, B. C. 657, being the 30th feria of such a cycle, January 18 must have been the 1st: Jan. 18 at this time being also the calendar date of the fourth lunar month in the current Apis cycle, as Feb. 16 was that of the fifth: the former answering to Mesore 19, Nab. 90, as the latter did to Thoth 13, Nab. 91. Either of these Julian terms, Jan. 18, the feria 1[a], or Feb. 16, the feria 30[a], might be considered the true epoch of the 60 days' cycle which came into existence in China at this time, B. C. 657, and which is still in use in that country. In our General Tables or Fasti Catholici, we have treated it as the former; and have therefore attached the entire succession of this cycle, (exhibited in those Tables under the letter L perpetually,) to this epoch of Jan. 18, B. C. 657.

* Only that in the case of new style and old style the difference affects the Julian nomenclature, not the feriæ of each; in this case the feriæ were nominally different, but the Julian date of each was the same.

Such is the true account of the origin both of the Metonic calendar, and of the cycle of 60 years, and of the cycle of 60 days among the Chinese; all of them still in use in China; the two latter without any change or modification to render them in the slightest degree different from what they were in B. C. 657, when they first came into existence; the former not still in the state in which it came into existence at first, but actually still in some state and condition of its being which is consequentially deducible from that, and differs *per accidens* only from what it was at first. This calendar has undergone no change since B. C. 657, but what has been accidental, and has merely affected its epoch; whether as some day in February, to which month it was first attached, or some one in January, or some one in December, nearer to the winter solstice; to which it appears to have been purposely adjusted at last. But as to the common origin of all these things in China, none of them goes further back than Feb. 16, B. C. 657, except hypothetically, and on the principle of the *reditus retro:* of which the modern Chinese have made a most liberal use, and not in the legitimate exercise of such a privilege, by carrying back the same positive or conventional mode of reckoning to any distance, for the sake of uniformity, or for any other reason consistent with candour and honesty in other respects; but, (as there is only too much reason to suspect,) for the very purpose of exaggerating the antiquity of these cycles, and through them that of their own annals, and of their own existence as a nation. All that can be admitted of the boasted antiquity of these cycles, or of this calendar, beyond what we have just assigned them, is that the lunar calendar and the cycle of 60 days may be said to have had an existence virtually ever since B. C. 742, in the Apis calendar and in the older cycle of 60 days, from which they were derived: but the cycle of 60 years had no existence in any shape, so far as we have been able to discover, before B. C. 657.

SECTION V.—*Proleptical adjustment of the nundinal and of the sexagesimal cycles to the hebdomadal and to each other.*

With a view to that comparison of these three cycles with each other which we propose to institute, it is desirable that

each of them should set out from the same point of time; and that too, if possible, the beginning of one of our periods. We shall begin therefore with setting back the epoch of the first of our types of the nundinal calendar, from B. C. 1100, the 21st year of period xxiv, to B. C. 1120, the 1st: and that of the second from B.C. 860, the 9th year of period xxvi, to B. C. 868, the 1st; and that of the third from B. C. 750, the 119th year, to B. C. 868, the 1st year also. We propose in like manner to set back the epoch of the Chinese calendar from B. C. 657, the 16th year of period xxviii, to B. C. 672, the first. And having done each of these things we propose to assume the epoch of the noctidiurnal succession in the nundinal and in the sexagesimal cycles respectively in the first instance analogously to that in the hebdomadal at the beginning of each of our periods; viz. 24 hours of mean time before the point of the vernal equinox, in each of these cycles as much as in the hebdomadal; and as dated according to the Julian rule from midnight.

Having given the nundinal character of May 22, B.C.1100, we know that of Jan. 1, the same year; that is, if we know that May 22 this year was nundinal, we know that Jan. 6 must have been nundinal also, and Jan. 1, in the first nundinal cycle of this year, must have been the feria 4ª. And if we know the nundinal feria of Jan. 1, B. C. 1100, we can ascend from it to that of Jan. 1, B. C. 1120: and from that we can obtain the nundinal character of any other day the same year, as for example that of April 1, the noctidiurnal epoch in the mean natural year at the ingress of period xxiv.

In like manner the nundinal character of March 25 B. C. 860, or of Feb. 4 B. C. 750, being given, (the feria prima in the orbis nundinalis of the time being;) we can ascend from either by necessary steps to the nundinal character of Jan. 1, B. C. 868, viz. the nundinal feria 4ª: and from that we can obtain the nundinal feria of March 30, the noctidiurnal epoch in the mean natural year, at the beginning of period xxvi; which is thus found to be the feria 4ª also.

TABLE I.

Nundinal calendar and nundinal cycle, adapted to the Julian year, from Jan. 1, B. C. 1120, *to May* 22, B. C. 1100.

B. C.	Days.		Nundinal. Jan.	Epact
1120	365	Jan. 1	7	5
19	365		2	5
18	365		5	5
*1117	366	Jan. 1	8	6
16	365		2	5
15	365		5	5
14	365		8	5
*1113	366	Jan. 1	3	6
12	365		5	5
11	365		8	5
10	365		3	5
*1109	366	Jan. 1	6	6
8	365		8	5
7	365		3	5
6	365		6	5
*1105	366	Jan. 1	1	6
4	365		3	5
3	365		6	5
2	365		1	5
*1101	366	Jan. 1	4	6
1100	365		6	5

TABLE II.

Nundinal calendar and nundinal cycle, adapted to the Julian year, from Jan. 1, B. C. 868, *to March* 25, B. C. 860.

April 1. Feria Nundinalis 5ª.

Table ii.

B. C.	Days.		Nundinal. Jan.	Epact	
868	365	Jan. 1	6	5	Mar. 30 Feria 4
67	365		1	5	
66	365		4	5	
*865	366	Jan. 1	7	6	
64	365		1	5	
63	365		4	5	
62	365		7	5	
*861	366	Jan. 1	2	6	
860	365		4	5	Mar. 25 Feria 1ª

May 22. Feria Nundinalis 1ª.

With regard to the sexagesimal cycle, we can easily and surely ascend from Feb. 16, B. C. 657, the feria 30ª, to Feb. 16, B. C. 672, the feria 12ª: and from that we can obtain March 27 the same year, the feria 51ª. According to the cycle previously in use, it was the feria 43ª; to which if we add eight, the actual difference of the two at first, it makes it the feria 51ª. We obtain the same result by reckoning 80 years back from B. C. 592, when the sexagesimal feria of March 27, deduced from that of Jan. 18, the feria 43ª, the same year, (as our General Tables, division L, *in anno* shew,) was also the 51st. For these sexagesimal feriæ return to the same order in the days of the month, and in the same year of the cycle of leap year in the Julian calendar, every 80 years. If therefore March 27 B. C. 592 was the feria 51ª, so must March 27 B. C. 672 have been.

SECTION VI.—*On the scale or proportion of the epact in each of these cycles, at the end of each of our periods.*

The next thing to be done is to exhibit the scheme of the epacts in each of these cycles, at the end of each of the periods of our Fasti, whether of 112, or of 140, or of 56 years in length; in order that we may see what proportion each of them bears to the same thing in either of the other successions perpetually.

Periods of the Fasti.

56 mean natural years = 20,453 days, or cycles of 24 hours.
.... = 2,921 weeks, 6 days.
.... = 2,556 nundinal cycles, 5 days.
.... = 340 sexagesimal cycles, 53 days.

112 mean natural years = 40,907 days.
.... = 5,843 hebdomadal cycles, 6 days.
.... = 5,113 nundinal cycles, 3 days.
.... = 681 sexagesimal cycles, 47 days.

140 mean natural years = 51,134 days.
.... = 7,304 hebdomadal cycles, 6 days.
.... = 6,391 nundinal cycles, 6 days.
.... = 852 sexagesimal cycles, 14 days.

Scale of the Epact.

Period of	Hebdomadal.	Nundinal.	Sexagesimal.
56 years	6 days or feriæ.	5 days or feriæ.	53 days or feriæ.
112 ..	6	3	47 .. ..
140 ..	6	6	14 .. ..

SECTION VII.—TABLE I.

Synopsis of the Noctidiurnal Succession in the mean natural annual cycle, in the Hebdomadal cycle, in the Nundinal cycle of ancient Italy, and in the Sexagesimal cycle of the Chinese. B. C. 1120—B. C. 672.

HEBDOMADAL. A									NUNDINAL. B							SEXAGESIMAL. C				
Period	D	B.C.	E	F	G	H	G	D.L.	F 1	G 1	E 1	H 1	G 1	K	L	F 2	G 2	E 2	H 2	G 2
xxiv	140	1120	6	Apr. 1	3	Apr. 2	4	E	Apr. 1	5	6	Apr. 2	6							
					2		3			3			4							
xxv	112	980	6	Mar.31	1	Apr. 1	2	F	Mar.31	2	3	Apr. 1	3							
					7		1			5			6							
xxvi	140	868	6	Mar.30	6	Mar.31	7	G	Mar.30	4	6	Mar.31	5							
					5		6			2			3							
xxvii	56	728	6	Mar.29	4	Mar.30	5	A	Mar.29	1	5	Mar.30	2	Septembris vi sive	2					
					3		4													
					2		3			6			7	viii Idus Septembres, Calendar of Romulus, cycle v. 3.						
xxviii	140	672	6	Mar.27	1	Mar.28	2	B	Mar.27	5	6	Mar.28	6	vii kal.Martias. Pompilian cal. cycle ii. 17.	6	Mar.27	51	14	Mar.28	52
					7		1													

TABLE II.—*Synopsis of the Noctidiurnal Succession in the mean natural annual cycle, in the Hebdomadal cycle, in the Nundinal cycle of ancient Italy, and in the Sexagesimal cycle of the Chinese.* B. C. 672—A. D. 225.

HEBDOMADAL. A									NUNDINAL. B							SEXAGESIMAL. C					IDELER. Chinese Calendar, p. 60–71. CC				
Period	D	B. C.	E	F	G	H	G	D.L.	F 1	G 1	E1	H 1	G 1	K	L	F2	G 2	E 2	H 2	G 2	A. D	H 2	G 2	Fasti Catholici. Division L. Sexagesimal Feria	
xxviii	140	672	6	Mar.27	1	Mar.28	2	B	Mar.27	5	6	Mar.28	6	vii kal. Martias. Pompilian cal.	6	Mar.27	51	14	Mar.28	52	1729	Mar.28	52		
					7		1			3				cycle ii. 17.			5								
xxix	112	532	6	Mar.26	6	Mar.27	7	C	Mar.25	2	3	Mar.27	4	iv kal. Martias. Pompilian cal.	4	Mar.25	4	47	Mar.27	6	1629	Mar.27	6	Jan.18	58
					5		6			5				cycle viii. 13.			51								
xxx	140	420	6	Mar.25	4	Mar.26	5	D	Mar.23	4	6	Mar.26	7	iii non. Martias. Decemviral cal.	7	Mar.23	50	14	Mar.26	53	1741	Mar.26	53	Jan.18	46
					3		4			2				cycle ii. 5.			4								
xxxi	140	280	6	Mar.24	2	Mar.25	3	E	Mar.21	1	6	Mar.25	5	viii id. Martias. Decemviral cal.	5	Mar.21	3	14	Mar.25	7	1641	Mar.25	7	Jan.18	1
					1		2			7				cycle viii. 1.			17								
xxxii	112	140	6	Mar.23	7	Mar.24	1	F	Mar.19	6	3	Mar.24	3	iv non. Martias. Irregular cal.	3	Mar.19	16	47	Mar.24	21	1781	Mar.24	21	Jan.18	16
					6		7			1				cycle iii. 21.			3								
xxxiii	140	28	6	Mar.22	5	Mar.23	6	G	Mar.17	8	6	Mar.23	6	ix kal. Apriles. Julian correctn.	6	Mar.17	2	14	Mar.23	8	1653	Mar.23	8	Jan.18	4
		A. D.			4		5			6				Ann. xviii.			16								
xxxiv	112	113	6	Mar.21	3	Mar.22	4	A	Mar.15	5 8	3	Mar.22	4	xii kal. Apriles. Julian correctn.	4	Mar.15	15	47	Mar.22	22	1793	Mar.22	22	Jan.18	19
					2		3			7			7	Ann. clviii.			2								
xxxv	140	225	6	Mar.20	1	Mar.21	2	B	Mar.13	6	6	Mar.21	6	xii kal. Apriles. Julian correctn. Ann. cclxx.	6	Mar.13	1	14	Mar.21	9	1665	Mar.21	9	Jan.18	7

TABLE III.—*Synopsis of the Noctidiurnal Succession in the mean natural annual cycle, in the mean or actual Julian, in the Hebdomadal cycle, and in the Sexagesimal cycle of the Chinese.* A. D 225—A. D. 1905.

HEBDOMADAL. A									SEXAGESIMAL. C					IDELER. Chinese Calendar, p. 60–71. CC				
Period	D	A. D.	E	F	G	H	G	D.L.	F 2	G 2	F 2	H 2	G 2	A. D.	H 2	G 2	Fasti Catholici, L. Sexagesimal Feria.	
xxxv	140	225	6	Mar.20	1	Mar.21	2	B	Mar.20	8	14	Mar.21	9	1665	Mar.21	9	Jan. 18	7
xxxvi	140	365	6	Mar.19	7	Mar.20	1	B	Mar.19	22	14	Mar.20	23	1805	Mar.20	23	Jan. 18	22
xxxvii	112	505	6	Mar.18	6	Mar.19	7	B	Mar.18	36	47	Mar.19	37	1705	Mar.19	37	Jan. 18	37
xxxviii	140	617	6	Mar.17	5	Mar.18	6	B	Mar.17	23	14	Mar.18	24	1817	Mar.18	24	Jan. 18	25
xxxix	112	757	6	Mar.16	4	Mar.17	5	B	Mar.16	37	47	Mar.17	38	1717	Mar.17	38	Jan. 18	40
xl	140	869	6	Mar.15	3	Mar.16	4	B	Mar.15	24	14	Mar.16	25	1829	Mar.16	25	Jan. 18	28
xli	140	1009	6	Mar.14	2	Mar.15	3	B	Mar.14	38	14	Mar.15	39	1729	Mar.15	39	Jan. 18	43
xlii	112	1149	6	Mar.13	1	Mar.14	2	B	Mar.13	52	47	Mar.14	53	*1709	Mar.14	53	Jan. 18	58
xliii	140	1261	6	Mar.12	7	Mar.13	1	B	Mar.12	39	14	Mar.13	40	1741	Mar.13	40	Jan. 18	46
xliv	140	1401	6	Mar.11	6	Mar.12	7	B	Mar.11	53	14	Mar.12	54	*1721	Mar.12	54	Jan. 18	1
xlv	112	1541	6	Mar.10	5	Mar.11	6	B	Mar.10	7	47	Mar.11	8	1781	Mar.11	8	Jan. 18	16
xlvi	140	1653	6	Mar. 9	4	Mar.10	5	B	Mar. 9	54	14	Mar.10	55	1653	Mar.10	55	Jan. 18	4
xlvii	112	1793	6	Mar. 8	3	Mar. 9	4	B	Mar. 8	8	47	Mar. 9	9	1793	Mar. 9	9	Jan. 18	19
xlviii	140	1905	6	Mar. 7	2	Mar. 8	3	B	Mar. 7	55	14	Mar. 8	56	*1825	Mar. 8	56	Jan. 18	7

SECTION VIII.—*Explanation of symbols.*

In these tables the letter A stands over the hebdomadal succession, B over the nundinal, C and also CC over the sexagesimal.

D. Sum of years, (whether mean natural or mean Julian,) in each period of the Fasti.

E. Hebdomadal epact at the end of each period.
E 1. Nundinal epact at the end of each period.
E 2. Sexagesimal epact at the end of each period.

F. Noctidiurnal epoch in the mean natural annual succession.
F 1. Noctidiurnal epoch in the Roman calendar of the time being.
F 2. Noctidiurnal epoch in the Chinese calendar.

G. Hebdomadal feria of F: and of the first integral period of 24 hours (the mean Julian equinox) in the mean natural year at the beginning of every period.
G 1. Nundinal feria of F 1: also of the first integral period of 24 hours in the mean natural year, (the mean Julian equinox,) in the nundinal cycle, and in the Roman calendar, at the beginning of each period.
G 2. Sexagesimal feria of F 2: also of the first integral period of 24 hours in the mean natural year, (the mean Julian equinox,) at the beginning of each period, in the sexagesimal cycle.

DL. Dominical letter, or hebdomadal index, at the beginning of every period, and of every cycle of 28 years in the course of the period.

H. H 1. H 2. } First integral period of 24 hours in the mean natural year, reckoned from midnight, the mean natural equinox, under the proper Julian date, at the beginning of each period.

K. Roman date, in the calendar of the time being, (whether that of Romulus, or that of Numa, or the Decemviral, or the Irregular, or the Julian correction of Cæsar,) answering to this natural term in H 1.

L. Nundinal character of this Roman expression of H1, taken from the calendar of the time being. The reader will observe that it is always the same with G 1, and therefore always a confirmation of G 1.

CC. Sexagesimal feriæ of this natural term H 2 in the Chinese calendar, at the beginning of each of our periods, obtained from Mr. Ideler's Chinese calendar of the present day, and introduced here for the sake of comparison with the same thing in C, under G 2, perpetually.

SECTION IX.—*Remarks on the above synopsis.*

i. It will be observed that the hebdomadal, the nundinal, and the sexagesimal feriæ of the noctidiurnal epoch, F, F 1, F 2, in these tables are obtained by one and the same rule perpetually, down to A. D. 225, and after A. D. 225 also: viz. by adding the epact at the end of the period, (E, E 1, or E 2,) to the feria at the beginning (G, G 1, G 2,) casting off from the sum, if necessary, a complete hebdomadal, nundinal, or sexagesimal cycle, and, (down to A. D. 225, but not after it,) diminishing the remainder by unity. The reasons of this process, and of this distinction in it before and after A. D. 225 respectively, have been explained in the preceding chapter.

ii. It will be perceived that in table i, from B. C. 1120 down to B. C. 728, the noctidiurnal epoch (F and F 1) descends according to the same rule both in the order of feriæ, (hebdomadal and nundinal), G and G 1, alike, and in the order of Julian exponents, F and F 1: and that for 392 years, i. e. from B. C. 1120 to B. C. 728, *mutatis mutandis* there is no difference in this respect between A and B.

B. C. 672, and from thenceforward down to A. D. 225, (that is, properly speaking all through table ii,) a difference begins to appear between A, and B and C; viz. that though the epoch in H 1 in B or in H 2 in C descends according to the same rule as before, and still like H in A, F 1 and F 2 do not descend in B and C after the same manner as F in A, and in the Julian notation common to all; but that, while F in A drops one number only in this notation with successive periods, F 1 and F 2 in B and C respectively drop two.

But that this distinction does not imply any real difference after B. C. 672, compared with the same thing before, either in B or in C, may be inferred from the fact that the descent of the epoch in the order of feriæ, neither in B under G 1, nor in C under G 2, before and after B. C. 672 down to A. D. 225, presents no new phenomenon; either in itself, or as compared with that of G in A.

iii. The anomaly just pointed out in this instance from B. C. 672 down to A. D. 225, between F 1 and F 2 here in B and C and F in A, is precisely the same which appeared in C of type i compared with CC of type ii, and *vice versa*, in the two tables last explained. And the reason is the same: viz. that as CC in type ii there was the noctidiurnal succession in a fixed and invariable Julian type, so are F 1 in B and F 2 in C here; viz. in B, that in the Roman calendar of Numa Pompilius, from a certain date in the course of period xxvii, viz. B. C. 712, and in C, that of the Chinese calendar from B. C. 672; both which calendars were Julian in principle if not in name, and therefore were as much fixed and invariable types of the noctidiurnal succession, on the principle of the annual Julian reckoning thereof, as type ii CC in table ii before. Nothing therefore takes place now in either of these successions, F 1 of B or F 2 of C, compared with that of F in A, which did not take place before in CC in type ii compared with C in type i.

iv. It is observable however all this time, that the proper Julian exponents of the mean natural vernal equinox, (the first integral period of 24 hours of mean solar time in the natural year, which enters all these successions alike at the beginning of each of our periods, in A under H, in B under H 1, in C under H 2,) go on descending in the same manner all through each; viz. one number for each period and no more; except in the case of period xxvii, when, for the reason explained in the last chapter[o], they drop two terms in the Julian notation instead of one; viz. from March 30 to March 28.

Now this is demonstrative proof that the march of the actual noctidiurnal succession, in the actual annual in the sense of natural, dated from the mean vernal equinox in this sense

[o] Page 483. section vii.

of the first period of 24 hours which enters the natural year in its integrity, proceeds exactly in the same way in each of these other successions, both in the hebdomadal in A, and in the nundinal in B, and in the sexagesimal in C; and just in each of these cases as in D of type i, in the last chapter. We proposed in that chapter to substitute something else for DD, the parallel succession to that of D there; and we have done so here; viz. in H 1 in B, and in H 2 in C; or more properly in K in B, and in the corresponding Chinese terms for H 2 in C: and we now see that there is no longer any ambiguity between D of type i and DD of type ii; that the same thing is denoted by each, viz. the first day of the mean natural year, reckoned from the point of the mean vernal equinox and from the point of midnight perpetually; and that the true Julian representative of this simple natural term perpetually in type i before is that which we exhibited in D; as appears from this comparison of H 1 in B and of H 2 in C with H in A here*.

* This comparison, (which should by all means be instituted now,) will satisfy the intelligent reader that the hypothesis on which type ii table ii, in the last chapter, proceeded, viz. that of a fixed and invariable Julian type of the noctidiurnal succession, before the date of the actual Julian type of that kind, A. D. 225, in all respects such as was there represented, is not possible.

Before this term of A. D. 225, if a type of the succession in question which is Julian in principle, (like the Roman or the Chinese calendar which we have been considering,) comes into actual existence, then the comparison of these different schemes together proves that the succession of Julian equinoxes, (the first integral noctidiurnal cycle in the mean natural annual cycle, under its proper Julian notation,) even in such a calendar, when the language of that calendar has been translated into that of the Julian, is found to follow the same law as the same thing even in our variable Julian types, under its proper Julian notation there too, the law of D in type i; but the simple noctidiurnal succession in the Julian notation, (the succession of hebdomadal feriæ,) even in such calendars, and in the language of such calendars translated into the Julian, follows the law of CC in type ii.

These examples therefore shew that, while the constant succession of mean vernal equinoxes under all circumstances in each of these cases goes on alike, the noctidiurnal succession goes on differently. The former recedes only 24 hours in each period perpetually; the latter recedes 48. And it will be manifest on reflection, that if this were not the case neither of two things, each of which must hold good perpetually, would be mat-

v. The noctidiurnal epoch in A drops over two Julian terms and two hebdomadal feriæ at the ingress of period

ter of fact; one, that the absolute sum of noctidiurnal time generated by the decursus of annual, (whether the annual of nature, or that of our variable Julian types, the perpetual representations of this of nature,) in each of our periods of the same length, must continue the same: the other, that the absolute sum of noctidiurnal time, which would be generated in the same time either by the decursus of the simple Julian calendar, or by that of any other agreeing in principle with the Julian, must be greater than the corresponding sum of time of the same kind, (time measured simply by the succession of days and nights in themselves and in the order of feriæ,) generated in the same time in the natural annual cycle.

The method which nature is found to follow, to maintain the proportion of these two things, i. e. to equate the greater to the less succession of the same kind, without disturbing the common notation made use of by both whether in the order of equinoxes or in that of feriæ, is simply to set back the noctidiurnal epoch, in the purely Julian succession, 48 hours every period, instead of 24: leaving every thing else the same. This rule is illustrated in F 1 and F 2, in B and C, compared with H 1 and H 2 respectively. The terms in F 1 and F 2 are positively Julian, as much as those in H 1 and H 2. Yet F 1 or F 2 recedes 48 hours perpetually on itself; whereas H 1 and H 2 recede constantly only 24.

The compensation thus effected is complete: that is, the equation of noctidiurnal time in natural annual in H 1 to the same thing in Julian in F 1, or of the former in H 2 to the latter in F 2, is complete. Nothing can exceed either the simplicity or the sufficiency of this law. The noctidiurnal succession *per se*, or simply in the hebdomadal, is a very different thing from the same thing as part and parcel of the annual. As part of the latter it must proceed in one way, and subject to one law perpetually; a law prescribed by the nature of the annual cycle itself. In respect to its own succession, it is susceptible of change *pro re nata.* It must be one thing in constant connection with natural annual time, as in C of type i, constantly referred to D; and another in actual Julian of any kind in connection with natural annual also, as in F 1 and H 1 in B, and in F 2 and H 2 in C, of the above synopsis. The change, which is perpetually going on, under F 1 and F 2 of B and C respectively, compared with H 1 and H 2, affects the noctidiurnal cycle in this latter capacity of a double and coinstantaneous relation at all times both to its own succession *per se*, and to its succession in the natural annual. It is a change of external proportions which it must be constantly undergoing, to fulfil both these relations at once. There is no other means of rendering one consistent with the other, perpetually.

It follows consequently that, if we proposed to exhibit the simple noctidiurnal succession along with the annual, and both under a common Julian notation, from the first, the rule should be to set back the epoch of the simple Julian succession 24 hours behind the epoch of the succession

xxviii B.C. 672; but that in B (in F 1) drops over no more nundinal feriæ than usual. The reason is *this:* That F and G in A are the succession of the *mean* cycle of night and day under its proper Julian denomination perpetually; and

in the annual cycle, just as we set back this latter epoch 24 hours behind the first integral cycle in the natural year; after the manner exhibited in the following table, which we have drawn out for the sake of illustration through the first seven periods of our Fasti.

Noctidiurnal succession, Julian and annual, through the first hebdomadal Period of the Fasti.

Period		A. M.	B. C.	A	Feria	B	Feria	C	Feria	D	Feria
i	112	1	4004	Apr. 23	6	Apr. 24	7	Apr. 25	1	Apr. 25	1
					5		6		7		
ii	140	113	3892	Apr. 22	4	Apr. 23	5	Apr. 24	6	Apr. 25	7
					3		4		5		
iii	112	253	3752	Apr. 21	2	Apr. 22	3	Apr. 23	4	Apr. 25	6
					1		2		3		
iv	140	365	3640	Apr. 20	7	Apr. 21	1	Apr. 22	2	Apr. 25	5
					6		7		1		
v	112	505	3500	Apr. 19	5	Apr. 20	6	Apr. 21	7	Apr. 25	4
					4		5		6		
vi	140	617	3388	Apr. 18	3	Apr. 19	4	Apr. 20	5	Apr. 25	3
					2		3		4		
vii	140	757	3248	Apr. 17	1	Apr. 18	2	Apr. 19	3	Apr. 25	2
					7		1		2		

A. Epoch of the Julian noctidiurnal succession.
B. Epoch of the natural annual.
C. First integral cycle, or period of 24 hours, in the mean natural year: mean natural vernal equinoxes.
D. Julian term of origination, April 25, continuing nominally the same perpetually.

It is indifferent to the simple noctidiurnal succession *per se* whether it sets out at the beginning of the first period on April 23 the feria 6ª, or on April 24 the feria 7ª, or on April 25 the feria 1ª; and at the beginning of the second, whether on April 22 the feria 4ª, or on April 23 the feria 5ª, or on April 24 the feria 6ª; and so on. It is manifest that in this scheme there will be two days more in every period, reckoned from the epoch in A to that in C, than in the same period reckoned from C to C perpetually. And such is the proportion which ought to exist between the simple noctidiurnal succession through every period, and the same thing in the annual, down to A. D. 225. After A. D. 225, the same thing holds good still; only that after A. D. 225 the epoch of the Julian succession would be properly represented by D, that of the natural as before by B; but B would still recede on D at the rate of 48 hours, in every period after A. D. 225, as A before did on C. The state of the case, in short, before and after A. D. 225, is one the reverse of the other; the natural epoch after A. D. 225 receding perpetually on the Julian, the Julian on the natural before. But the effect is the same in either case, in preserving the proportion of the simple noctidiurnal succession in the natural year to the same thing in the Julian perpetually.

It is easy to draw out a scheme, similar to the above, in illustration of

consequently that of *mean* feriæ in the hebdomadal cycle: F 1 and G 1 are the succession of *actual* cycles in the *actual* order of nundinal feriæ. Now B. C. 672 two mean hebdomadal feriæ and two mean Julian terms became merged in one actual term of each kind respectively; but no two actual nundinal feriæ, any more than any two actual hebdomadal feriæ, were ever merged in one. Nor consequently the actual Julian exponents of such actual nundinal feriæ.

vi. The truth of these parallel representations both in A and in B is confirmed by K and L in B, compared with H 1 and G 1 respectively: for K is the actual Roman date answering to H 1 for the time being, whether in the calendar of Romulus, or in that of Numa, or in the Decemviral, or in the Irregular calendar, or lastly in the correction of Julius Cæsar; and L is its actual nundinal feria for the time being, taken from the Roman calendar of the time being also. L is always the same with G 1; and therefore it is always a confirmation of it. And both K and L (though taken and inserted here from our Roman calendar) may be implicitly depended

the nundinal and of the sexagesimal successions. The Julian epoch in each too down to A. D. 225 will require to be set back 48 hours at the beginning of every period. We shall be content to exhibit this succession in the nundinal calendar, (i. e. in the actual Roman calendar,) merely, from B. C. 672 to A. D. 225.

Noctidiurnal succession in the Roman calendar from period xxviii B. C. 672 *to period xxxv* A. D. 225.

Period	Years	B.C.	A	C	B	D	B	E	B
xxviii	140	672	6	Mar.26	4	Mar.27	5	Mar.28	6
xxix	112	532	3	Mar.25	2	Mar.26	3	Mar.27	4
xxx	140	420	6	Mar.24	5	Mar.25	6	Mar.26	7
xxxi	140	280	6	Mar.23	3	Mar.24	4	Mar.25	5
xxxii	112	140	3	Mar.22	1	Mar.23	2	Mar.24	3
xxxiii	140	28	6	Mar.21	4	Mar.22	5	Mar.23	6
xxxiv	112	A.D. 113	3	Mar.20	2	Mar.21	3	Mar.22	4
xxxv.	140	225	6	Mar.19	4	Mar.20	5	Mar.21	6

A, Nundinal epact at the end of the period. B, Nundinal feria. E, Succession of natural equinoxes in the Julian year. D, Noctidiurnal succession in the natural year, 24 hours before E. C, Julian noctidiurnal succession, 24 hours before D: down to A. D. 225.

upon; for their own calendar in each of these instances has been rigorously verified in every possible way.

SECTION X.—*On the descent of the epoch of the noctidiurnal succession in the order of nundinal feriæ over two numbers at the ingress of period xxxv, A. D.* 225.

One explanation only is further necessary here; viz. that A. D. 225, at the ingress of period xxxv, the noctidiurnal epoch in B, under F 1 and G 1, drops over two nundinal feriæ instead of one, while the same epoch in A, under F and G, in the hebdomadal succession exhibits no new phenomenon.

This distinction touches on one of the most curious, the most interesting, and on every account the most remarkable coincidences, which the history of time brings to light; and it serves more than any thing else to illustrate the wonderful but invisible Providence, which has watched over and directed the course of time from first to last; and in particular which prepared the way by degrees for the introduction and final establishment of that form of the civil reckoning both of noctidiurnal and of hebdomadal and of annual time, whether Julian or Gregorian, which Christians are everywhere using at present.

It is a great mistake to suppose that the date of the Julian correction was that of the actual Julian calendar. The true date of this last was 269 years later. The kalends of January in the first Julian year were left by Cæsar attached to December 30, B. C. 46: and, in the interval between the first Julian year and the 270th, they underwent a variety of changes; advancing at one time as far forward as Jan. 3, and falling back at another as low as December 28.

Never however was the calendar so much tampered with or so greatly deranged as in the reign of Commodus: and yet, if those liberties had not been taken with it *then*, if, among the other wanton and capricious acts of the emperor Commodus, he had not meddled with the calendar to a much greater extent than any of his predecessors had ventured to do, the coincidence to which we have alluded, humanly speaking, would not have taken place; that is, not at the

precise moment, and in the identical manner, at which and in which it had been already determined by Providence that it should.

Thirty-two years were necessary to repair the disorder introduced into the calendar by Commodus; at least without any violent remedies. U. C. 977 however, the kalends of January had now been fetched up to par with December 31, A.D. 223. It is evident therefore that if, at this juncture, U.C. 977 was actually treated as a *leap* year at Rome, and A. D. 224, in the proleptical Julian reckoning, could be treated as a *common* year, then on the kalends of March, U. C. 977, and on March 1, A. D. 224, the Julian correction of Cæsar, and the Julian calendar of chronology, (the actual Julian calendar at present in use,) pushed back to March 1, A.D. 224, but no further, would meet, would coincide with each other, and become absolutely one and the same.

Now both these things are matters of fact. We have contemporary testimony to produce (of the most authentic kind) that U. C. 977 at Rome was administered as a leap year, and had the usual bissex, (as the Julian rule itself required it should,) in that year. And as to the Julian calendar, or Julian reckoning, prior to March 1, A. D. 224, it had no actual existence except in the shape of the xxxivth type of our own Fasti; which, having come into use in A. D. 113, had now served its time, and was ready to leave our tables in this very year.

In the last year of each of our periods, (as in this instance from March 1 A. D. 223, to March 1 A. D. 224,) there is no leap day in the regular order of the period. There *is* a leap day even in an extreme case like this; but it is supplied by the type coming in, not by the type going out at this point of time[a]: and the type going out at this moment being the xxxivth of the Fasti until then, and that coming in being the same with the Roman correction of Cæsar itself, the leap day wanting at this moment was supplied by the Roman correction; of which we have already observed that, U. C. 977, not only ought it to have had the regular leap day in that year of the cycle, but also that it actually had it.

[a] See this more particularly explained in the Introduction to the Tables, part ii. chap. iv. section 3.

At this moment therefore, viz. on the kalends of March U. C. 977, March 1 A. D. 224, the mean natural year, the true type and exemplar of actual annual time from the first, the Julian type of this year of which we make use in our Fasti perpetually, the actual Roman correction of the dictator Cæsar, and the Julian year of chronology carried back from the present day as far as March 1, A. D. 224, but no further, were absolutely identical; and if the Roman correction of Cæsar from this time forward experienced no fresh change, it would be perfectly indifferent to the true course and succession of noctidiurnal, hebdomadal, and annual time in the sense of Julian, whether it began to proceed and to be carried on thenceforward in the xxxvth type of our Fasti, or in the actual Roman correction of Cæsar, that is, in the actual Julian year itself.

And it is another extraordinary fact that from this time forward the Roman calendar, which had never stood still for any great length of time together for 269 years before, underwent no more changes of any kind. The absence of all disturbance, and of all appearance of unsteadiness, is as characteristic of it from this time forward, as the want of consistency and uniformity, and as the absence of fixedness before. No observation or research of our own will detect any innovation in this calendar after A. D. 225, down to the date of the Gregorian correction.

We have met with many extraordinary things in the history of time; but with nothing so remarkable as this. No ingenuity, no sophistry, will succeed in resolving such coincidences into chance; and if not, it would be as irrational and absurd to deny as impossible to doubt that the Julian form of the reckoning of civil time in all its measures, (under which we include the Gregorian,) must have been contemplated from the first; and that the moment appointed for its final and permanent introduction into use, among Christians, was the kalends of March U. C. 977, March 1 A. D. 224, or the kalends of January U. C. 978, Jan. 1 A. D. 225.

It follows that, U. C. 977 A. D. 224, the nundinal dates in B under G 1 must drop one nundinal feria *per saltum* more than usual, to fall in with the actual course of the nundinal cycle at Rome, and under its proper Roman dates at the

same point of time; yet without any change in the succession of nundinal feriæ themselves. And this is confirmed by the matter of fact. For as our table (table ii) shews March 21, (the mean Julian equinox, A. D. 225), on the feria 6ª of the nundinal cycle, so does our general Roman calendar U. C. 978 shew the iii nonas Januarias (Jan. 3.) on the feria 1ª, and therefore xii kalendas Martias, March 21 Roman = March 21 Julian also at this time, on the feria 6ª. And setting out from this point of time, the iii nonas Januarias, U. C. 978 A. D. 225, on the feria prima, (and therefore from the kalends of January, (Jan. 1.) on the feria septima,) of the nundinal cycle, we are able to trace this cycle both in the Roman and in the Julian calendar, (all this time indeed the same,) down to U. C. 1108 A. D. 355; when also, (through another remarkable Providence,) there is again contemporary evidence in existence, whereby we can prove that both the hebdomadal and the nundinal cycle were united on the kalends of January or first of January that same year; though under ordinary circumstances, and in the regular administration of two such cycles in the Julian calendar, the same hebdomadal and the same nundinal feria, and the same day of the month in the same year of the cycle of leap year, could coincide only once in 896 years $= 32 \times 28$.

Section XI.—*On the verification of the succession in* C.

In like manner the verification of the succession in C is supplied by CC, and by the dates there quoted from Mr. Ideler's Chinese Calendar [b].

To understand these, all that requires to be said in explanation is, That as the solar cycle in the Julian year is one of 28 years, $(7 \times 4,)$ and in the nundinal cycle, applied to the Julian calendar perpetually, is one of 32 years, $(8 \times 4;)$ so in the sexagesimal cycle of 60 years, and in the sexagesimal cycle of 60 days, and in the Julian cycle of leap year all in conjunction, it is one of 60×4 or 240 years. That is, as the same Julian date returns to the same feria in the hebdomadal cycle in the same year of the cycle of leap year in 28 mean or actual Julian years, and to the same in the nundinal in the same year of the cycle of leap year in 32 mean or

[b] Berlin 1839, 4to.

actual Julian years; so it returns to the same in the sexagesimal, in the same year of the cycle of leap year and in the same year of the cycle of 60 years, in 240 mean or actual Julian years.

Mr. Ideler's modern Chinese Calendar[c] is drawn out in *annis expansis* from A. D. 1641 to A. D. 1840; and there is scarcely one of our periods, from B. C. 672 to A. D. 225, or after, to the beginning of which some corresponding year may not be found in this calendar, at the distance of 240 years, or of some multiple of 240. And wheresoever these are to be found, the sexagesimal characters of the mean Julian equinoxes, shewn by our table in C, ought to be the same as those of the same Julian dates, indicated by Mr. Ideler's list. The corresponding succession in CC, which accompanies that of C throughout, and has been obtained in this manner from the actual Chinese calendar at these points of time, according to Mr. Ideler, shews that they are so in every instance.

It is not however necessary merely for the verification of the succession of sexagesimal feriæ, that we should take into account over and above the years of the sexagesimal cycle; and if we leave these out of the account, then the period of restitution, which brings back the same sexagesimal feria to the same Julian date in the same year of the cycle of leap year, becomes a period of 80 years, not of 240. For the reader will at once understand that the cycle of 60 days must enter six times completely into a cycle of 365 days, or of 366 days, with five days over in the former case, and with six in the latter. The epact of this cycle therefore in the common years of the Julian cycle of leap year is five, and in the leap years of the cycle is six. Now in 80 Julian years there will be 60 common years and 20 leap years. The sum of the epact then in 80 Julian years will be $60 \times 5 + 20 \times 6$: $300 + 120 = 420$; that is, seven cycles of 60 days complete. The feriæ of the sexagesimal cycle therefore must return to the same Julian terms, in the same order of their notation and in the same years of the cycle of leap year, in 80 mean or actual Julian years.

Accordingly we have filled up the list in CC from Mr. Ideler's

c Berlin, 1839, 4to.

calendar, by means of this period of 80 years, in such instances in which it could not be completed by means of that of 240: and these cases are denoted by the asterisk prefixed to them. Besides these, we have added also the sexagesimal character of the proper sexagesimal radix or epoch throughout, Jan. 18, at the beginning of every period; taken from division L in our Fasti Catholici. The reader will easily comprehend what use is to be made of this, in comparing CC with C perpetually, when he understands that, in the Julian leap year, the sexagesimal feria of Jan. 18 is always the same as that of March 18, and, in the common years of the cycle, as that of March 19: and that the first year of each of our periods is the second year of the Julian cycle of leap year.

The comparison of C with CC, thus instituted, demonstrates two things: i. That the sexagesimal noctidiurnal cycle of the Chinese, traced perpetually either from Jan. 18 or from Feb. 16, B. C. 657, down to the present day, has never varied from itself; ii. That the scheme of this succession, exhibited in C, is as much the true at all points of time downwards from B. C. 657, as Mr. Ideler's at the present day.

APPENDIX TO DISSERTATION VI.

CHAPTER I.

On the only legitimate mode of proceeding, in tracing the course of the noctidiurnal succession, in the hebdomadal and in the annual, backwards from the present day.

SECTION I.—*Statement of the case.*

WE have had occasion to observe[a] how impossible it must be to trace the course of past time backwards, after any order or by any steps but those in which and by which it came downwards. The truth of this observation is strikingly illustrated by the account which has thus been given of the actual decursus both of noctidiurnal and of hebdomadal and of annual time, in conjunction one with another from the first. Every one must now comprehend the

[a] Supra, p. 445.

impracticability of attempting to follow any of these parallel successions up to its source again, in any way except one which should be precisely the reverse of that which has thus been exhibited. It may be worth our while however, still more particularly to illustrate and confirm the same position by means of an actual example; which, (for certain reasons, to be explained by and by,) we shall take from A. D. 30, the true date of the year of the Passion.

SECTION II.—*On the determination of the hebdomadal date of the Passion,* A. D. 30, *on the principle of the* reditus retro.

The hebdomadal date of the Passion of our Saviour, whatsoever may have been the year of the Passion itself, must have been the feria sexta; or, as we should call it, a Friday. No one can doubt of that fact. There must also have been an actual lunar date of the Passion; which, agreeably to the paschal rule of the Jews, ought to have been the lunar 14th. Whether that lunar 14th was cyclically determined and cyclically reckoned, (that is, according to the regular cycle of a lunar calendar of some kind,) or taken directly from the heavens, is a distinct question; which for the present, if we please, may be left open and undecided. In conformity also to the strict paschal rule of the Jews from the earliest to the latest times, this lunar 14th ought to have been the first lunar 14th after the vernal equinox. Let the problem therefore, proposed for solution in the first place, be this: What was the true place, in the order of hebdomadal feriæ, of the mean vernal equinox, reckoned from midnight, A. D. 30?

Now one method of solving this problem, and probably the first to suggest itself, would be *this:* i. To fix on some year at the present day which stood at the distance of an even number of cycles of leap years from A. D. 30, (for example, A. D. 1842,) in which it was known to ourselves from actual observation that the point of the mean vernal equinox, reckoned or assumed to be reckoned perpetually from midnight, fell on the feria secunda, or Monday. ii. The number of mean natural years, from the point of the mean vernal equinox, A. D. 30, to the point of the mean vernal equinox, A. D. 1842, being 1812; the number of mean nights and days, contained in these, according to the standard of our Fasti, is 661,818, and 22 h. 58 m. 4 sec. 48 th. of another; which however in such a case as this, and for the sake of the calculation which we are instituting, may be treated as 661,819 days complete. And in this number of integral cycles of night and day, (integral periods of 24 hours of mean solar time,) the number of cycles of seven, that is, of what

would be considered at first sight and treated as weeks, contained in them, would be 94,545; and four days over and above of another.

iii. This being the case, it would appear to be a legitimate as well as an obvious inference from these premises, that if the last integral-cycle of 24 hours in these 661,819 such cycles in all, the fourth integral cycle in the 94,546th week, (the mean vernal equinox reckoned from midnight A. D. 1842,) was the feria secunda, (known to ourselves from actual observation to have been so,) the first integral cycle of the same kind, the first such cycle in the first week, the mean vernal equinox dated from midnight A. D. 30, must have been the feria quinta.

We could not find fault with any one who might think of attempting the solution of such a problem as that which we have just proposed, in the first instance of all, after this method; because we have often endeavoured ourselves to solve similar problems in a similar manner; under an apprehension too that the principle of the method was sound and good. We are not ashamed to own that we now perceive that this was a great mistake; and after the exposition, which has been laid before our readers, of the true course of annual time in hebdomadal before A. D. 225 and after it respectively, we are persuaded that they cannot fail to perceive this too.

The fact however still holds good, that 1812 mean natural or tropical years of the standard of our own Fasti must contain 661,819 integral periods of 24 hours, and 94,545 cycles of such periods by sevens at a time, (i. e. of what appear at first sight to be weeks,) and four cycles more of a 94,546th: and in this fact, compared with what has just been said, there seems to be a difficulty, and an inconsistency approaching almost to a contradiction in terms. To admit that these 1812 mean natural years must contain 94,545 weeks, four days, and that the last of these days must have fallen on the feria secunda; seems almost of necessity to involve the admission that the first of them must have fallen on the feria quinta.

But in reality there is no inconsistency between this state of the case *de facto* in A. D. 1842, and what we have just asserted of the use made of it, to determine the state of the case A. D. 30. The explanation is simply *this:* The order of feriæ in the hebdomadal cycle continuing fixed and invariable all along; the noctidiurnal succession going on in that order in the same manner perpetually, but going on also in the natural cycle of annual time perpetually; and one period after another of seven cycles of night and day being generated by this noctidiurnal succession in the natural year perpetually;

yet all being reckoned from the point of the mean vernal equinox at the beginning of one of our periods to the point of the mean vernal equinox at the beginning of the next: these cycles of sevens, in their collective amount from period to period successively, neither begin nor end on the same day in the order of feriæ perpetually, nor, with respect to their actual beginning and their actual ending relatively to this order, do they follow the same law perpetually, but one law before A. D. 225 and another after it. It follows that, as referred to the order of feriæ, the order of such weeks cannot be treated as continuous. There must be interruptions in that order between the end of one such week and the beginning of another, which, in the above method of solving the problem proposed, are totally overlooked, and left out of the account.

The proper method of solving a problem like this, on the principle of the *reditus retro*, or of the consequential deduction of a fact in the decursus of past time from a similar fact in present and passing time; we apprehend would be the following:

The xlviith period of our Fasti bearing date A. D. 1793; the point of the mean vernal equinox, referred to the order of feriæ, was falling at that time, as our tables shew, on the feria 4^a at midnight. Now, as nothing more than the constant revolution of a particular cycle of 24 hours from the point of midnight to the point of midnight perpetually, the date of the mean vernal equinox for the whole course of one of our periods is subject to the same law as any Julian term whatsoever, similarly reckoned from midnight to midnight perpetually; that is, it returns to the same feria at the same moment of midnight every 28 years. If then in the first year of a given cycle of 28 years it is assumed to be falling on the feria 4^a at midnight, it will be found to be doing so again at the beginning of the next; and in the 22nd year of this second cycle it will be found to be falling on the feria 2^a at midnight.

Cycle of the mean vernal equinox, from midnight to midnight, in the order of feriæ, in the xlviith period of the Fasti.

Period	Cycle of 28 years.				
xlvii	i	year 1 ..	A. D. 1793 ..	V. E. ..	Feria 4^a at midnight.
—	ii	— 1 ..	— 1821 ..	— ..	— 4^a at midnight.
—	....	— 22 ..	— 1842 ..	— ..	— 2^a at midnight.

We should thus obtain the feria of the mean vernal equinox in the 50th year of the xlviith period of our Fasti from its feria in the first, after the only legitimate method which, on the principles of these Fasti, could be employed for the purpose. We should find

our conclusion, so obtained, confirmed by the testimony of the calendar, both that of the Julian and that of the Gregorian, in this year, A. D. 1842 : March 9 being the calendar Julian date of the mean vernal equinox, A. D. 1842, and March 21 the Gregorian ; the former of which (the Dom. lett. being D) was the feria 2[a], and the latter (the Dom. lett. new style, being B) was the feria 2[a] also.

The next step in the process would be to reckon 12 of our periods, or 1568 years, from the 50th year of period xlvii, A. D. 1842, to the 50th year of period xxxv, A. D. 274 : and the feria of the mean vernal equinox, A. D. 274, being 12 numbers in the order of feriæ higher than that of the mean vernal equinox, A. D. 1842; if this latter was the feria 2[a] at midnight the former must have been the feria 7[a] at midnight, $(2+12$ or $14=7)$. The Julian calendar for the time being confirms this : for A. D. 274, the Julian date of the mean vernal equinox being March 21, and the Dom. lett. being D, March 21 was the feria septima.

The next process in the operation would be to reckon two more of our periods (252 years) from the 50th year of period xxxv, A.D. 274, to the 50th year of period xxxiii, A. D. 22 : and this date being 203 years earlier than the true date of the actual introduction into use of the modern Julian calendar, A. D. 225, the feria of the mean vernal equinox, reckoned from midnight, A.D. 22 should be four numbers in advance of its feria A.D. 274; and *this* being the feria 7[a], *that* must have been the feria 4[a]. We cannot indeed confirm this conclusion too by the testimony of the actual Julian calendar; but we can do so by that of the true Julian calendar of the time being, which is the Julian type of our Fasti in this xxxiiid period. The Julian style of the mean vernal equinox, in the 50th year of that period A.D. 22, was March 23; and the Dom. lett. being B, March 23 was the feria 4[a].

This point then having been ascertained that A. D. 22, in the 50th year of our xxxiii[d] period, the feria of the mean vernal equinox was the feria quarta; it follows that in the 58th year of the same period, A. D. 30, it would be the feria septima; that is, the Julian style of the mean vernal equinox A. D. 30 being still March 23 at midnight, March 23 reckoned from midnight A. D. 30 must have been the feria septima. And thus we should arrive at last at the solution of the problem proposed, and by means of a series of steps necessarily connected with each other; not one of which could be called in question without disturbing the entire course and succession of time in all and each of its measures from first to last.

SECTION III.—*On the coincidences which distinguish and characterize the true date of the Passion,* A. D. 30.

It happens moreover by virtue of a remarkable coincidence, that this date March 23 A. D. 30, the Julian style of the mean vernal equinox for the time being, was also the Julian date of the true new moon in the month of March the same year[b].

There can be no question then that this new moon must have been the paschal moon of that year. No moon could have answered more completely than this to the conditions of the paschal moon, if those had any respect to the mean vernal equinox; as it is most certain that they always had. And this coincidence will not be lost on the attentive student of the gospel history; that in the true year of the Passion, A.D. 30, the true *luna prima* fell out on the true day of the mean vernal equinox, and the paschal 14th, or true passover day, fell on the true lunar 14th, next after the mean vernal equinox: which being the case, no passover day ever did or ever could have answered more justly to the characters and conditions of the true paschal day in one of its most essential respects.

We are concerned at present however only with the feria of this paschal day. And this being the same as that of the lunar 14th, and that of the lunar 14th under all circumstances being the feria next before that of the luna prima; if the feria of the luna prima, A. D. 30, coincided with that of the mean vernal equinox, and that of the mean vernal equinox was the feria 7[a], the feria of the lunar 14th, and that of the passover day, must have been the feria 6[a]. And both the mean vernal equinox and the luna prima, A. D. 30, in the Julian style being March 23; both the lunar 14th and the passover day the same year in the same style must have been April 5: and the Julian March 23 being the *feria septima* reckoned from midnight, the Julian April 5 must have been the feria sexta reckoned from midnight too.

We do not consider it necessary to enter here on the question whether the paschal 14th of the Jews must necessarily, and under all circumstances alike, have been the true lunar 14th. We have satisfied ourselves that the paschal 14th among the Jews, like the Easter 14th among Christians, was always determined by a cyclical rule; and not by a direct observation of the heavens: and therefore that the question of the true paschal date in a particular instance would be much mistaken, were it to be argued on the supposition

q See the calculation of this new moon, in the Introduction to the Tables, part iii. at the end.

that the paschal 14th must of necessity be the lunar 14th; and not on the hypothesis that it must always be the regular 14th of a regular lunar cycle, whether that agreed with the true lunar 14th *pro tempore* or not. It is an inseparable accident of every cyclical lunar calendar, however correct in its principles and however regular in its administration, to vary, at stated times and to a certain extent, from the heavens; but no perfect calendar of this kind will ever permanently disagree with the heavens, nor will ever want the means of redressing and rectifying its own temporary variations from the truth.

In this particular year A. D. 30 however, it was so ordered by the Divine Providence, (as if on purpose to preclude all doubts on this score,) that the true cyclical 14th, as determined by the ordinary rule of the calendar, and the true lunar 14th, determined by the actual course of the moon in the heavens, should be the same thing; and that both should meet together in the same Julian date, April 5, and in the same hebdomadal feria, the feria sexta[c].

The same remarkable Providence is perceptible in another instance of the same kind, the most deserving to be compared with this of all which could be selected from the history of the Jewish calendar; viz. that of the true year of the Nativity, B. C. 4, and of the lunar characters of that year also, both cyclically determined, or according to the calendar, and truly, or according to the moon. In that year, and on the true birthday of our Lord and Saviour Jesus Christ, Nisan 10 in the Jewish, April 5 in the Julian style, the true cyclical lunar 10th, and the true natural lunar 10th, met together[d]; just as the true cyclical 14th and the true lunar 14th afterwards did in the day of the Passion. This cyclical or true lunar 10th too B. C. 4 was the 14th day after the date of the mean vernal equinox, dated from midnight that year, (March 23,) just as the cyclical and the true lunar 14th were A.D. 30. And both this cyclical and this true lunar 10th, the date of the Nativity B.C. 4, coincided with the feria septima *exeunte,* or feria prima *ineunte,* of the hebdomadal cycle; as the cyclical and lunar 14th in the year of the Passion, and the Julian date of the Passion, coincided with the feria sexta. Nor will these coincidences be lost on the careful observer of gospel facts; whatsoever profane and inconsiderate or sceptical men, (who cannot or will not recognise the finger of God even in such extraordinary dispensations of his

c This follows of course from the fact that the true luna prima or new moon in March A. D. 30, was March 23. See however the calculation of the full moon of this month, Introduction, part iii. as before.

d See the calculation of the new moon of March, B. C. 4: Appendix to the last volume of this work.

Providence as the Incarnation, the Nativity, and the Passion, and in the circumstances of each of those events, among which none were more important than *time* and *place*,) may think about them.

Without proof of the fact however, no one would have a right to assume that the lunar calendar of the Jews, at the beginning of the gospel æra, was not true to the moon. Nor can any proof of such an assumption be produced from the matter of the fact, in any shape or form whatsoever. Thus much we make bold to assert, without fear of contradiction. All the proofs which are accessible, all the matters of fact which can be alleged on such a question, lead to the contrary conclusion; that, whatsoever was the kind of lunar calendar in use among the Jews at this time, it was admirably adapted to its proper purpose; i. e. a cyclical measurement of lunar time which should be always as near to the truth as calendar lunar time can be to true. There was probably nothing equal to it in the world at the same point of time, unless it was among the Hindus, the Chinese, and the Siamese. It is certain at least that there was nothing of the same kind among the Greeks, and much less among the Romans, at this time, which could be compared with it. And yet the Greeks in particular, about the beginning of the gospel æra, were in possession of lunar calendars, which had long been carried to the highest degree of perfection to which they ever attained; and there was one such almost at the gates of Jerusalem, the common lunar calendar of the Greeks of Syria and Cœle Syria, which deserved all the praise which could be bestowed on the most exact and perfect of the Hellenic lunar calendars in general. Yet this was much inferior to the contemporary lunar calendar of the Jews, by which all their feasts at this period were regulated; as we trust to be able to demonstrate to every one's satisfaction, by actual comparison of the two together, if we are permitted to reach that stage of our work when it will be necessary for us to do so.

SECTION IV.—*On the question at issue between the author of "Dissertations on an Harmony of the Gospels," and the author of the "Ordo Sæclorum."*

We have selected this year, A. D. 30, as the subject of the preceding remarks, not only on account of its intrinsic importance, seeing it is the true year of the Passion, (in which the place of the mean vernal equinox in the order of feriæ, and the relation of the true paschal 14th, and of the true or of the cyclical lunar 14th, both to the mean vernal equinox and to the hebdomadal cycle, are necessarily to be taken into account), but also because Mr. Browne,

the author of the "Ordo Sæclorum [e]," when engaged in commenting upon and controverting our own conclusions, respecting the date of the Passion and various other points of importance to the chronology of the Old or of the New Testament [f], made choice of the same year, to subject it to the test and criterion of an argument, founded on the decursus of the noctidiurnal cycle and of the hebdomadal in the mean natural year, or in the mean lunar year [g], which, though not the same in terms with that which we began with proposing and applying, is so in principle and in substance; and in the opinion of the author of the *Ordo* amounts to a demonstration of the *physical* impossibility that the lunar 14th, A. D. 30, could be the feria 6ª, or any thing but the feria 4ª; which he maintains it was.

We trust that the objection, which Mr. Browne considered so fatal to the system of gospel chronology proposed in our Dissertations, has been satisfactorily answered; and that the fallacy, involved in his reasoning itself and in all such modes of determining questions of fact like these on the principle of the *reditus retro*, without a proper idea of the true course in which time itself in all its measures has come down perpetually; has been laid open in a manner intelligible to the comprehension of any of our readers. And if this is the case, then as neither Mr. Browne nor we ourselves, even when differing in our opinions on particular points, ought to have any object in view but the discovery of the truth, we think it unnecessary to notice any thing else which occurs in the same part of his work, personal indeed as regards ourselves, but totally irrelevant to the question at issue between us.

This question is summed up in one proposition: Whether the mean vernal equinox, A. D. 30, was really the feria 5ª at midnight, as Mr. Browne maintains, or the feria 7ª, as we maintain. How much more however is virtually involved in the decision of this one question, the learned author of the Ordo Sæclorum, (unless he had arrived at the knowledge of the truth through the same process and by the same steps as we ourselves have done,) could not have been aware. But it is nothing more or less than this; Whether the various courses and successions of noctidiurnal, of hebdomadal, of menstrual, of annual time, both natural and Julian, in constant connection with the present system of things, could each have had that epoch which Scripture assigns it, or not? And in particular, whether the noctidiurnal, the hebdomadal, and the natural annual cycles, all dated from the ingress of the same period of 24

e Ordo Sæclorum, by Henry Browne, M. A. London, 1844.

f Appendix, chap. ii. 510–545.

g Ibid. page 522. § 471.

hours at midnight, did really set out from the feria 1ª at midnight, or from the feria 6ª at midnight? If from the latter, then Mr. Browne's hypothesis, that the mean vernal equinox, A. D. 30, was the feria 5ª at midnight, would be true and matter of fact: but if from the former, then it is impossible that it could have been matter of fact. Nothing could have been matter of fact in that case, except that the mean vernal equinox, A. D. 30, was the feria 7ª.

As to accidental distinctions, or what might be considered such; for instance, whether the proper Julian style of this natural term, A. D. 30, is to be March 23; whether this Julian term of March 23, the style of the mean vernal equinox A. D. 30, was also the Julian style of the luna prima in March that year; whether the 14th of this moon, in the same style, is to be designated April 5; we conceive such questions to be trifling, and that there ought to be no difference of opinion between any two persons of common sense concerning them. We are at issue on *this* point only, whether the mean vernal equinox, A. D. 30, was the feria 5ª at midnight, or the feria 7ª at midnight. Mr. Browne's line of argument leads to the former conclusion; that which we ourselves have explained and enforced in every part of the present work, from beginning to end, leads to the latter. It does not become us to say that Mr. Browne is in the wrong, or that we ourselves are in the right. Let others decide between us.

SECTION V.—*Analysis of the actual noctidiurnal succession from the vernal equinox,* A. D. 30, *to the vernal equinox,* A. D. 1793, *in cycles of sevens, successively generated.*

It may contribute however to expose still more clearly the fallacy which lies at the bottom of that mode of solving such problems as these, which we began with stating; if we actually analyze the interval from the mean vernal equinox, A. D. 30, to any similar natural term at present, as resolvable into cycles of seven days and nights, seven integral periods of 24 hours, successively generated by the constant recession, as well as decursus, of mean natural annual time in noctidiurnal and in hebdomadal. It is not proper to call these cycles *weeks*, in the ordinary sense of that term; for the week in its ordinary meaning is nothing different from the hebdomadal cycle; and the hebdomadal cycle is the constant revolution of the noctidiurnal in a certain order of feriæ, which never varies. The cycles of which we are speaking, we shall see, are not cycles of seven in this sense; and therefore it is not proper to call them weeks.

The year which Mr. Browne selected for comparison with A. D.

30, viz. A. D. 1842, might be conveniently adapted for his own purpose; but being the 50th year of one of our periods it is not so proper for ours, which requires the first year of a period. There can be no objection, we apprehend, to our fixing on the first year of period xlvii itself, of which this year was the 50th; viz. A. D. 1793; nor to our comparing with it not the 58th year of the xxxiiid period, A. D. 30, but the 1st, B. C. 28.

There are 1820 mean natural years, from the point of the mean vernal equinox B. C. 28 at midnight to the same at midnight A. D. 1793; and these, according to the standard of our Fasti, would contain 664,740 days, 21 h. 28 m. 48 s.: or 664,741 days, 94,963 weeks, or complete cycles of sevens. It would be an obvious inference from this latter fact, that the feria of the mean vernal equinox B. C. 28 must have been the same as that of the mean vernal equinox A. D. 1793, which our tables shew on the feria 4[a]. But we have learnt to distrust such *prima facie* inferences as these: and how the feria of the mean vernal equinox A. D. 1793 was really dependent upon, or determined by, that of the mean vernal equinox B. C. 28, (the decursus of this same natural term from one of these terms to the other having gone on meanwhile according to its proper law, and its descent from midnight, at the ingress of one period, to midnight at that of another being capable of being measured by cycles of seven days and nights perpetually), the following synopsis will shew.

Synopsis of the successive accumulation of integral periods of 24 *hours of mean time in the natural year in cycles of sevens, from the vernal equinox* B. C. 28 *to the vernal equinox* A. D. 1793. *Radix of the succession the vernal equinox,* B. C. 28, *March* 23, *the Feria sexta, at midnight.*

Period		Sum of years	B. C.	Vernal Equinox	Feria	Cycles of sevens	Days	
i	xxxiii	140	28	Mar. 23	6			
			A. D.		5	7,304	6	
ii	xxxiv	112	113	Mar. 22	4	7,304	6	Entering at midnight, March 22, Feria 4^{a}.
					3	5,843	6	
iii	xxxv	140	225	Mar. 21	2	13,148	5	Entering at midnight, March 21, Feria 2^{a}.
						7,304	6	
iv	xxxvi	140	365	Mar. 20	1	20,453	4	Entering at midnight, March 20, Feria 1^{a}.
						7,304	6	
v	xxxvii	112	505	Mar. 19	7	27,758	3	Entering at midnight, March 19, Feria 7^{a}.
						5,843	6	
vi	xxxviii	140	617	Mar. 18	6	33,602	2	Entering at midnight, March 18, Feria 6^{a}.
						7,304	6	
vii	xxxix	112	757	Mar. 17	5	40,907	1	Entering at midnight, March 17, Feria 5^{a}.
						5,843	6	
viii	xl	140	869	Mar. 16	4	46,751		Entering at midnight, March 16, Feria 4^{a}.
						7,304	6	
ix	xli	140	1009	Mar. 15	3	54,055	6	Entering at midnight, March 15, Feria 3^{a}.
						7,304	6	
x	xlii	112	1149	Mar. 14	2	61,360	5	Entering at midnight, March 14, Feria 2^{a}.
						5,843	6	
xi	xliii	140	1261	Mar. 13	1	67,204	4	Entering at midnight, March 13, Feria 1^{a}.
						7,304	6	
xii	xliv	140	1401	Mar. 12	7	74,509	3	Entering at midnight, March 12, Feria 7^{a}.
						7,304	6	
xiii	xlv	112	1541	Mar. 11	6	81,814	2	Entering at midnight, March 11, Feria 6^{a}.
						5,843	6	
xiv	xlvi	140	1653	Mar. 10	5	87,658	1	Entering at midnight, March 10, Feria 5^{a}.
						7,304	6	
xv	xlvii	112	1793	Mar. 9	4	94,963		Entering at midnight, March 9, Feria 4^{a}.

After what has been said in illustration of former tables of this kind, this in particular calls for no peculiar explanation.

We will observe only; That having the feria of the mean vernal equinox at the ingress of period xxxiii given, viz. the feria 6^{a}; and having the number of periods from B. C. 28 to A. D. 1793 given also, viz. 14 complete; we might arrive at the same conclusion, respecting the feria of the equinox A. D. 1793, from its feria B. C. 28, by a much more summary process; viz. by taking the number of descents of the first natural term on the first feria, (unity in every period, 14 in all,) adding two, for the extra descent in the first two periods ($14+2=16$), casting off 14 (7×2) and subtracting the remainder (2) from the feria of the epoch, the feria sexta. It follows that the feria of the mean vernal equinox, at the ingress of period xlvii, A. D. 1793, reckoned from midnight, should be ($6-2$) the feria 4^{a}: as in fact it was.

DISSERTATION VII.

Fasti Cyclici and Origines Kalendariæ.

CHAPTER I.

Section I.—*On the confirmation of the above conclusions by the testimony of the civil calendar.*

If the account which has thus been given of the different measures of time, of the principles in which the existing distinctions of time are founded, of the laws by which the course of time has always been regulated, of the operation of one part of the system of time on another, and of the manner in which the whole requires to be represented and to be brought down in all its parts, individually and collectively, from the first; if this account, we say, however agreeable to the reason of things, concerned only the natural measures of duration, (that is, time itself in its most abstract form, and in its most general relations to every thing else,) if it did not appear to be connected at last in some manner or other with matter of fact, if it did not issue out in some sensible result, open to observation and confirmed by experience every where: it might justly be said to be more speculative than practical, more curious than useful.

For though it is true in theory that there are no measures of time essentially different from each other but those of nature; it is equally true in point of fact that the actual measures of time have never been these measures of nature in their simple and natural form. The civil and not the natural day has always served for the measure of the noctidiurnal cycle; the civil and not the natural month for that of the lunar; and the civil year of some kind or other and not the natural for that of the annual. To these civil distinctions of time as opposed to the natural, and in particular to the annual, the largest and most comprehensive of all,

(which in fact includes the other two,) we give the general name of the CALENDAR.

The practical proof of the truth of our principles, and the confirmation of all our conclusions hitherto, must be sought for and found, if any where, in this branch of our inquiries, which at present is new and unexplored; in the relations of the calendar measures of time to those of nature from first to last, in the sources, the history, the laws and administration of the civil calendar, as supposed to have had its foundation perpetually in the constitutions of nature, and to have been in fact only a modification of the calendar of nature itself; in one word, in what we may call the ORIGINES KALENDARIÆ; in the calendar of nature, purposely subjected from the first to the convenience of man, and differently affected at different times according to the ever varying rule of human convenience; yet never departing beyond certain limits from its own standard; never losing its likeness to itself; and under all distinctions of circumstances, and under all diversities of external appearance, retaining perpetually the impress of the same original type.

And we flatter ourselves that, as this part of our subject must be pronounced one of the most important and most indispensable on which we have yet entered; so it will be found the most curious and interesting as well as the most useful and instructive. We know from experience at least, that none is so comprehensive in its scope and extent, none is so copious and rich in its materials, none is so complicated and voluminous in its details, as this; and we trust it will be found in due course of time that none is so valuable for the discoveries to which it leads, none renders such eminent services to religion, none supplies such demonstrative proofs of the truth of the Bible, none clears up and decides so many obscure and doubtful questions of profane history and profane chronology, none does so much to correct the vulgar and inveterate prejudices even of the learned on many most important points, about which those prejudices have led them far astray from the truth; none casts such a flood of light (of sudden and unexpected light) on what have hitherto been regarded (and justly too) as the darkest and voidest periods of the past.

In short, to the chronologer, to the historian, or to the philosopher, who is desirous of having clear views on his proper subject perpetually, and of being put in possession of data for the foundation of his reasonings, which may safely be trusted; nothing is so necessary and nothing so invaluable as these Origines Kalendariæ; without the assistance of which the attempt to explore the past must still be (what it has always hitherto been) to grope in the dark, to unravel the mazes of the Cretan labyrinth without the thread of Ariadne. And as to ourselves in particular and the object which *we* have had in view from the first; we do not hesitate to say that the *coronis* of all our reasonings, the *colophon* of all our proofs, will be supplied by this division of our subject; and if that is not found to be the case, we are content that all which we have as yet said or maintained should pass for nothing. The truth of those principles which we have hitherto been defining, explaining, and defending in theory, if by the Divine blessing upon our labours we are permitted to complete this part of our task, will be illustrated, authenticated, and confirmed by nothing more clearly or more infallibly than by the testimony of these Origines Kalendariæ. At least we are willing ourselves that the truth of the former should be rested on this issue, Whether it is practically confirmed by the latter or not? leaving it to the judgment of others to decide upon it for themselves, after they have read and attended to the proofs, which it will be our business to lay before them.

SECTION II.—*Statement of the propositions maintained in this part of the present work.*

The truths which we have hitherto asserted, concerning this connection between the natural and the civil measures of time from the first, may be summed up in the following propositions, which we shall not scruple to lay down in the broadest manner and in the most unqualified terms; being well assured that no latitude of expression, which we shall be seen to allow ourselves in these particular statements, will ultimately be found to have exceeded the truth.

i. That the positive or civil measures of time, understood in the sense in which we have hitherto explained them, have

ultimately no origin distinct from that of the natural; that both the civil and the natural came into being together in the same week of creation, (properly so called, in connection with the existing system of things,) in the same heptaëmeron or hexaëmeron of Scripture, A. M. 1, B. C. 4004; the first civil day along with the first natural day, the first civil month with the first natural month, and the first civil year with the first natural year, and *vice versa;* all within the compass of the same seven days of both kinds, the seven days comprehended between April 25 the feria prima at midnight, and May 2 the feria prima at midnight; and that both, having come into existence at this time in conjunction, have continued in existence together, and have gone on in one form or other together, ever since, either absolutely or relatively the same as at first, the civil day as the natural, the civil month as the natural, and the civil year as the natural year.

ii. That we may confine ourselves at present, (as the subject on which we are about to enter requires we should,) to the two largest and most comprehensive of these measures of either kind, the natural year and the civil year; Though the form of the civil year from the first was never identical with that of the natural, it was the nearest approach to identity with it in integral cycles of night and day, which in the nature of things was possible; and it was always identical with itself. In other words, the original form of the civil year every where was the equable solar year, such as we have already described and explained it, in former parts of our work [g].

iii. That for a long time after the beginning of the present system of things, and after the first actual commencement of time itself in all and each of its measures in connection with it; there was no form of the civil year, nor consequently any form of the calendar, any where in existence or among any part of mankind, except this primitive equable one.

iv. And lastly, That all the artificial and positive methods of reckoning annual time, all the modifications of the civil year, all the forms and varieties of the calendar, properly so called, different from this primitive one, which have ever

[g] Diss. iii. chap. iv. sect. iii. ix.

existed or do still exist in any part of the world, and among any part of mankind, were originally derived from this; and, when they are traced up to their sources and resolved into their first principles, are found to be merged in this.

SECTION III.—*On the nature of the proof by which the above propositions are demonstrated.*

The truth of these several propositions does not rest on *our* assertion, but on the evidence of facts; on the actual testimony of calendars which once existed or do still exist. It has been *our* duty and *our* business in the first instance merely to investigate the history, and to examine and analyze the structure, of *every* calendar both ancient and modern, of which any thing is known or can be known; and then, but then only, from the discoveries thus brought to light, to draw the inferences embodied in the preceding propositions. We have laboured to the best of our ability in the discharge of this preliminary duty; and, as we are bound to acknowledge with the deepest sense of gratitude, it has pleased the Divine Author of all light and all truth, to bless even our individual inquiries so far that they have in every instance, through the same steps, led to the same result. Every calendar of which any thing has come to our knowledge, and as far as it has come to our knowledge, according to the terms of our last proposition, being traced up to its origin and resolved into its first principles, has turned out invariably to be one and the same; and come down as low as they may in one direction, and go back as far as they may in another, all calendars, ancient and modern, are offshoots and ramifications of one simple and uniform stock; all lose their individual being and distinctions, all are merged and absorbed, in one simple and uniform type.

From such an actual state of the case as this, we consider ourselves justified in drawing *this* general inference, along with all the important consequences of any other kind which are necessarily included in it: That the civil calendar of mankind at first, the primitive calendar of all mankind, was the same, and neither more nor less than the simple equable solar calendar, of which we have already given some account. There cannot be a plainer or a stronger instance of the argu-

ment from induction. This argument, whensoever it can be applied, in the principle of its reasoning is the most conclusive and convincing of all. The difficulty is only to find out a case to which that principle is strictly applicable in all its comprehension and all its force.

It is the aim and the effect of this mode of reasoning to found a general comprehensive conclusion on the evidence of its truth in particular instances; and the force of the general conclusion is directly proportional to the number of these particular cases. If this number is small and limited, the inference founded upon it is proportionally weak and precarious. As the number of the particular cases of the truth becomes greater and greater, the probability of the conclusion founded upon them rises in proportion. But when the number of the particular proofs is so great that no one instance can be alleged to the contrary, that every particular case which can be produced is to one and the same effect; then the principle of this mode of reasoning, and of arriving at an enlarged and comprehensive perception of truth, is fully carried out in practice. The inductive process is now complete. It remains only to draw the inference; which founded on such premises is demonstrated, and comes with the force of an intuitive proposition. The process of reasoning from the premises to the conclusion, so directed, and so consummated at last, like the pyramid sloping from the vertex to the base, rests on the broadest and firmest grounds of support.

Now this is in fact the real state of the case, both as it appears to our own mind, when reviewing the particular results of those minute and laborious investigations into the history, the laws, the administration and details of the calendar, especially of ancient times, which we have been compelled to institute in order to carry this process of reasoning into full effect, and such as we trust it will some time appear to the apprehension of any of our readers, who shall only have patience to accompany these researches of ours from beginning to end; viz. That there is not a single exception to the general conclusion in question any where discoverable; and if there are not innumerable instances still capable of being adduced in which it holds good, there are more than suf-

ficient to establish it beyond all reasonable doubt or contradiction.

Innumerable instances of the fact it is evident there could not be; because the number of calendars, however great, must still be finite: and if no more can be actually adduced than we ourselves shall be found to adduce, it is not because more might not once have existed and once have been capable of being adduced, but because they have ceased to exist and cannot now be recovered. Numbers of actual calendars have been utterly and irrecoverably lost. All traces of their existence, of their origin, and of their connection with any thing else, have perished with them. Among those which do still survive in one form or other, or the prior existence of which is still discoverable from the notices relating to them which have come down to posterity; the fact which we assert holds good, to the utmost meaning of the assertion. There is not a single exception to our general proposition to be met with in this class of its particular cases. There is not a single calendar which does not contribute its testimony to the same fact of a common origin, and of a common connection with something else, distinct from itself and older than itself, yet in every case the same. And notwithstanding the ravages of time, the destruction of historical materials, the revolutions of kingdoms, the change of circumstances both moral and political which has been perpetually going on in all parts of the world; these are still so numerous that the general inference, founded on such particular evidence of the truth as this, can never be said to rest on a precarious basis; and the wonder is after all, not that we have no more particular instances of the truth to appeal to, but that we have so many.

In a word, though every instance of this kind, discoverable even at present, may not have passed under our own observation, and much must still remain to be completed by others before the argument can be said to be exhausted; enough we trust will be found to have been done, even in the present work, to confirm the general truth which we propose to establish. If every particular case treated of hereafter should not be seen to be reduced to the same degree of certainty; a candid and impartial construction of that fact will

ascribe it to the inadequacy and to the uncertainty of the *data* from which we have to reason in such cases. That the tendency of every case without exception is one and the same; that each contributes to confirm the same general conclusion in its proper degree; that the less of historical obscurity hangs over a particular calendar, the less reason there is to doubt of this tendency and of this confirmation; and that in a great majority of these instances the fact for which we contend in all is clearly established; we do not hesitate to affirm. And this is sufficient to justify us in asserting that the induction is complete. The general conclusion, founded on so many concurrent proofs of the fact in particular instances, cannot be denied.

CHAPTER II.

SECTION I.—*On the classification of calendars derivable from the primitive.*

To proceed however to a summary statement of the proofs which lead to this conclusion. The first thing to be done is to point out the principle of the *classification* of calendars, derivable or derived from the primitive. And this is easily effected.

It is not possible in the nature of things that the civil calendar can be of any kind in general except solar or lunar, or something made up of both. There may be a form of the reckoning of annual time even for civil purposes, based on the sidereal year; and such forms of the civil year do actually exist at present, and some time or other may come under our notice. But the sidereal year in these instances is the representative of the solar. It is the solar, under a different name, and in another shape. We may lay it down then as a general principle, that the civil year must either be the solar or the lunar; or something compounded of both.

The primitive civil year accordingly every where was solar; and the original form of that solar year was the equable.

Such having been the nature of the civil year every where at first, and such the constitution of the calendar, there was no room *a priori* for innovation in it or variation from it except in one of two ways; either the substitution of a lunar or of a lunæsolar year for this primitive solar one altogether, or the substitution of a modified form of this solar year itself for the original one. The effect of the first of these substitutions would be a generic and total change in the character and constitution of the calendar from that time forward; the effect of the latter would be a specific and a partial one, but not necessarily an entire and complete one.

It is found accordingly in every instance of the kind which comes to our knowledge, that the substance and effect of the changes, to which the primitive calendar in the course of time was subjected, amounted to *this:* Either a lunar year, not before in use, was substituted for the solar year in use from the first, and consequently a lunar calendar for the primitive solar calendar; or the character and constitution of the solar year before in use were modified and remodelled in a certain manner, and by these means the civil year and the civil calendar of primitive antiquity, without ceasing to be solar in general, were rendered a different kind of solar year and solar calendar from what they were before.

And though it is very possible in theory to imagine various forms of the lunar reckoning of annual time, and various modifications of a solar year, like the equable, and consequently an almost endless diversity of ways in which it might seem to have been equally possible to supersede, to remodel, to alter the internal or the external form and constitution of the calendar before in use; yet in point of fact the variations of either kind, which appear to have been actually made in it, are comparatively few and simple, and very much the same in the principle of the change every where, and still more so in the operation and effect: while as to the mode or process of the innovation, it was no where abrupt and violent, but every where as nearly regular and in the due course of things before going on as possible. In every instance of the rise of a new calendar, it is seen to spring out of the old; to have its roots at the time and ever after in the stock of the old. In most instances too the first day of the old in the

current reckoning of the calendar at the time was adopted as the first of the new; and even where this was not done, the reasons which led to the selection of a different epoch are discoverable; so that the connection of the new style of the calendar with the old, the derivation of the new form of the civil reckoning of annual time from the old, is just as clear and unquestionable in this case as in the other, in which there can be no doubt about it from the first.

SECTION II.—*Modifications of the primitive calendar, which did not affect its constitution and character as solar.*

We shall next proceed to give a brief account of these various changes themselves, as they may be collected from the history of calendars. And first of those modifications of the primitive solar year and primitive solar calendar, by virtue of which, without ceasing to be solar as much as before, it became a different solar year and solar calendar from what it was before.

In point of fact it turns out that these modifications or changes in general were only *twofold:* i. The substitution of a purely Julian form of the solar year and solar calendar for the purely equable: ii. The substitution of a new form of the equable solar year for the old; whereby it continued externally and in appearance equable still, yet became in effect essentially and intrinsically a different thing. Of each of these in its turn.

SECTION III.—*On the cases of the Julian solar year and solar calendar, substituted for the primitive equable year and equable calendar, or associated with it.*

The simple Julian reckoning of annual time, in which the cycle of the leap day is agreeable to the proper Julian rule of intercalation once in four years, after what has been said in preceding parts of our work, requires no further explanation. All that we need to observe on this subject at present is, that this proper cycle of the leap day or of the leap year, once in four years perpetually, is not bound to bear date from Jan. 1 or March 1, or from any particular day in the Julian calendar more than another; though such is the rule *de facto* in the Julian calendar properly so called, and none can be the

proper Julian rule but that. This cycle of four years might be reckoned from any day in the Julian calendar, which might be fixed upon for that purpose, provided it was always the same; and the rule of such a cycle would be strictly Julian. Among the Alexandrians of old, and among the Copts or Christians of Egypt still, it was and is yet reckoned from August 30. Among the Greeks of the lower empire, down to the time when their calendar ceased to exist, it was reckoned from September 1 or 2. And so in various other instances which might be mentioned. Yet all these calendars were Julian; and their proper cycle of the leap day was the strictly Julian one, of once in every four years.

i. The first of these simply Julian calendars, derived from the primitive equable solar year, and ever after in existence along with it though not substituted for it, which meets us in coming down with the history of this primitive calendar every where, appears in Egypt. It is the Phœnix calendar of the ancient Egyptians; which we so denominate, because it came into existence along with the Phœnix cycle of the ancient Egyptians also. It is discoverable that this Primo-Julian calendar of Egypt had a double date; one attached to the 1st of Thoth Æra Cyclica 2159, Nov. 18, reckoned from midnight, B. C. 1848, the other to Tybi 7 Æra Cyclica 2159, March 24 B. C. 1847, the epoch of the sphere of Mazzaroth; of which more will require to be said hereafter.

Such is the oldest type of the simply Julian calendar, which appears to have come into actual existence any where; yet not independent of the primitive civil calendar, but derived from it. It took its rise in Egypt; but it was never substituted (even in Egypt) for the primitive civil calendar. It merely coexisted with it ever after in that country; for uses and purposes too of a peculiar kind, which may be better understood hereafter. The principle of the Julian year however having been once discovered and once applied in this manner in practice; it will not be considered surprising that it was repeatedly applied in Egypt on later occasions: in other words, that this phœnix type of the Julian year, derived from the primitive equable calendar, is not the only one discoverable in Egypt yet similarly derived also. All these were of later date; and as at present we are

enumerating such instances of simply Julian calendars, so derived from the primitive calendar at any time and any where, as they present themselves in the order of our inquiries, we will take each of these other Julian calendars of Egypt only in its proper order of time.

ii. The second type of the Julian calendar, derived from the primitive, meets us in Egypt too, in the shape of a calendar of that kind to which we have seen reason to give the name of the Mneuis calendar; attached to the epoch of Thoth 1 Æra Cyc. 2326, October 9 at midnight B. C. 1681. Neither did this supersede the primitive civil calendar in that country. It merely coexisted along with it ever after.

iii. The third type of the simply Julian calendar, similarly derived from the primitive, which we discover, is the Sothiacal calendar of the ancient Egyptians; attached to the epoch of Thoth 1 Æra Cyclica 2657, July 22 B. C. 1350; but having a double Julian epoch, July 22 and July 21. And along with this type we may specify another, which appears to have come into being at the same time, attached to the original date of the Isia among the Egyptians, Athyr 17 Æra Cyclica 2657, October 6 B. C. 1350; but having also another Julian term as well as that, October 5: which therefore we may call the Isiac type of the Julian calendar in Egypt. Neither of these interfered with the continued existence and constant use of the primitive equable year in Egypt; neither at the time nor ever after. They merely coexisted with it from the time when they came into being, serving certain uses and purposes of their own.

iv. The fourth type of the simply Julian calendar, derived from the primitive, meets us in a quarter in which the learned of the present day, (and indeed of any day since the revival of letters,) will be least of all prepared to expect it, viz. in Greece; in the Panathenaic calendar of Erichthonius, attached to the epoch of Thoth 1 Æra Cyclica 2661, July 21 B. C. 1346, and having also a second Julian date, July 20.

v. The fifth type similarly derived meets us also in Greece, in the Eleusinian correction of the primitive calendar by Eumolpus, and in the Thesmophorian correction of Triptolemus; each of them attached to the same day in the equable style for the time being, the proper date of the Egyptian Isia,

Athyr 17 Æra Cyclica 2701; and to the same Julian date, Sept. 25, B. C. 1306; but liable also to a second Julian date, Sept. 24.

vi. The sixth Julian type, similarly derived from the primitive equable year, is the Olympic correction of the primitive calendar by Pelops; attached, for the sake of the cycle of the Olympic feriæ, not to the first of Thoth Æra Cyclica 2747, but to the 1st Epagomene Æra Cyc. 2746, June 25 B. C. 1260. It does not appear that any of these Hellenic Julian corrections interfered with the use and observance of the primitive equable calendar, as the civil calendar of Greece; in which respect it continued just the same as before.

vii. The seventh Julian type is the Babylonian correction of the primitive solar year, attached to the epoch of Athyr 17 Æra Cyclica 2901; and to the Julian date of August 8 B. C. 1106; but having also the Julian date of August 7. Neither did this Julian correction at Babylon interfere with the primitive equable calendar there too.

viii. The eighth Julian type derived from the primitive calendar, which we consider ourselves to have discovered, is the Samothracian; the equable epoch of which at first was Athyr 17 Æra Cyc. 3073, the Julian was June 27 B. C. 934; but liable also to fall back to June 26.

ix. The next which we discover is the Julian correction of the primitive calendar peculiar to Thebes in Egypt; and, as we may probably see reason to conclude, to many parts of the ancient Æthiopia; its epoch at first being Thoth 1 Æra Cyc. 3118, March 31, B. C. 889. And either this or a similar calendar, as we have also seen reason to conclude, was adopted within the course of the next four years by the priests of the temple of Jupiter Ammon in Libya.

x. After this, we have discovered no more down to the date of the Alexandrine correction of the primitive calendar in Egypt, Thoth 1 Æra Nab. 723, August 30 (=29) B.C. 26.

xi. The next of which we are aware is the Cathayan and Iguran correction of the primitive calendar, attached to the epoch of Thoth 1 Nab. 1578, Jan. 28 A. D. 830.

xii. The next is the Peruvian correction of the primitive calendar, Thoth 1 Æra Nab. 1685, Jan. 1 A. D. 937.

xiii. The next to this is the Araucan correction of the same primitive calendar; Thoth 1 Nab. 1769, Dec. 11 A.D. 1020.

xiv. The last which we shall mention at present is the modern Abyssinian calendar, directly obtained from the primitive; Thoth 1 Nab. 2185, August 29 A.D. 1436.

We suspect the existence of other simple Julian types besides these, and similarly derived from the primitive, in different parts of the world; but we consider it sufficient at present to enumerate these. More too might be added to this list, only that they were not derived from the primitive directly, or without any intermediate step. Calendars also, derived from the primitive, must be considered Julian, if they embodied the principle of the mean Julian year, whether they were outwardly and professedly Julian or not. Such was the Roman correction of Numa Pompilius, of the date of B.C. 712: and such was the nature of the Japanese correction of B.C. 660, and of the Chinese of B.C. 657: besides many others which might be mentioned; none of which is set down in the above list.

SECTION IV.—*On the cases of the substitution of a new form of the solar year for the old, distinct from the simple Julian.*

With regard to that other modification of the primitive calendar, which left it in appearance the same as before but in reality different; the name of Julian may be given to any form of the reckoning of annual time which is Julian in principle; that is, the standard of which is the mean annual Julian cycle of 365 days 6 hours, whether the cycle of leap year peculiar to it is one of four years or not. We may conceive various cycles of the leap year, all founded on this mean standard, and consequently agreeing in principle perpetually with that of the simple Julian calendar, and at stated times even actually.

In point of fact however, the state of the case, which the history and analysis of calendars bring to light, is this: That while the mean standard of the annual cycle, substituted in repeated instances for the primitive equable year, was assumed in the strictest conformity to the purely Julian one of 365 days 6 hours; the cycle of compensation, or of the correction of the simple year of 365 days, required by such

an assumption, was fixed to a period of 120 such mean or actual Julian years; or to one of 52. In one of these cases, the simple year of 365 days was allowed to go on according to its own law for 120 years, and in the other for 52 years, at a time; and then a month of 30 days was intercalated in it all at once, in the former instance, and a month or a week of 13 days, in the latter.

It is evident that calendar time administered on such a principle as this was virtually and essentially Julian, yet externally and in appearance equable or cyclical. For this reason we have thought it best to give such calendars the name of *Cyclico-Julian.* And this is by far the most numerous class of derivative calendars, substituted from time to time for the primitive; and as retaining the likeness of their original so long after they had ceased to possess the reality, they carry along with them the strongest and most striking evidence of the uniform primitive type, and of its peculiar nature and constitution, from which they were all derived.

It is evident also that every variety of this cyclico-Julian form of the primitive calendar being founded on the same relation of the purely equable to the purely Julian year, each of them implies an equal knowledge of the nature of this relation on the part of its authors, whosoever they were, and whensoever and wheresoever such corrections were made. All of them must have been equally well acquainted with the true principle of the simple Julian reckoning of annual time. We observe further that the cycle of 120 years in these cases is characteristic of the cyclico-Julian corrections of the old world, Africa, Asia, (Upper and Lower,) and Europe; that of 52 years of those of the new world; of Spanish America in particular. The first instance of the former is discovered in India, in connection with the first introduction into that country of the worship of Deunūs and Durga, the Osiris and Isis of India; attached to the epoch of Athyr 17, Æra Cyclica 2701, Sept. 25, B. C. 1306: the next in Phrygia, the work of Midas, and, of the same age in point of antiquity, the correction of Cinyras his contemporary, at Paphus in Cyprus: and several others of the same, or of similar dates.

Among the cyclico-Julian corrections of Spanish America, with the cycle of 52 years, the Toltec is the clearest

and most indisputable case of the kind; though whether that or the Yucatan correction is the more ancient of the two, admits of a question. The cyclico-Julian corrections with the larger cycle of 120 years are too numerous to be particularly specified at present: and a list of them will be subjoined hereafter. They are more rare of occurrence, it is true, in Europe than in Asia: and yet the ancient Swedish and Norwegian calendars, if we are not mistaken, will supply undoubted examples of the kind, even in Europe.

Besides these distinctions in the kinds of calendars substituted for the primitive, without introducing any direct and obvious change in the appearance of the primitive itself, we have not been able ourselves to detect any more; so that in fact, as the primitive calendar was solar before it was subjected to such changes, so it continued solar even after them; and in these latter cases it continued apparently the same kind of solar year as before: for it is manifest that with so long a cycle of leap year as this of 120 years, though such calendars might be Julian in reality, they must be revolving or cyclical at a given time, just as much as before. And yet it is certain, (being confirmed by indubitable proofs of the fact, and by the comparison of these cyclico-Julian modifications of the primitive calendar with that calendar itself, after long intervals of time,) that they were actually fixed and stationary within the limits prescribed by the law of the cycle; and that they were uniformly administered ever after the correction according to the proper cyclico-Julian rule, in a manner well qualified to excite both surprise and admiration, when the nicety of the process in such cases is contrasted with the regularity and with the precision of the execution.

There was one calendar of this description, the Persian correction of Gjemschid, which aimed at combining two such apparently inconsistent characters and conditions as those of cyclico-Julian and of Julian at once; and not only proposed this, but by means of a very curious and peculiar arrangement and administration of its own, accomplished its purpose.

Nor in this numerous class of cyclico-Julian calendars, with this long cycle of 120 years, have we discovered more than two, in which the simply cyclical calendar previously in

use was purposely modified, with a view to the substitution of a cyclico-Julian one in its stead, and in which the preliminary steps necessary to that effect must actually have been taken, and the calendar must have received the impress of novelty inseparable from such an effect, and must have retained it ever after; and yet the substitution did not actually take place: the calendar continued cyclical as much as before.

These two calendars were the Armenian and the Cappadocian. We have no doubt that the motive to the change in each of these cases in the first instance was a desire to accommodate both the Armenian and the Cappadocian reckoning of civil time to the Persian; Persia being the power to which both Armenia and Cappadocia at that time were subject. And this is confirmed by the date of the change itself, as far as it extended, B. C. 462; the epoch of the third secular correction of the Persian calendar according to the rule of Gjemschid. That the first steps towards the change were actually taken at this time is proved by the history of both these calendars; and is attested even by the phenomena of the Armenian at the present day. And yet it is not less certain from the same kind of evidence of the fact that the proposed change never went beyond the initiative, and that the principle of the cyclico-Julian correction was never realized in either; and yet these calendars once modified to a certain extent retained the impression of that modification ever after, and the Armenian retains it still. Nor is it surprising that this should have been the case with the adoption of the Persian rule by these calendars, as something foreign and exotic to themselves from the first; when even in Persia itself, within 13 years after the date of the fourth secular correction, the rule of Gjemschid fell into complete abeyance; and continued in that state more than 600 years, before it was restored and reinforced.

CHAPTER III.

On the Lunar in contradistinction to the Solar modifications of the primitive calendar.

SECTION I.—*The* εἰκοσιπεντετηρὶς *or Apis cycle.*

As to the forms of the lunar reckoning of annual time, which appear to have been either associated with the primitive form of the reckoning of annual solar time or substituted for it; There was one such form which, as we have already explained[h], was predisposed above all others to coalesce with the equable reckoning of annual solar time; and in fact was the natural lunar cycle of that particular form of the solar year; viz. the eikosipenteteris, the lunæsolar period of 25 equable years, the Apis cycle of chronology.

It is evident however from the nature of the case in this instance, that there could be no substitution of a lunar year of this description for the primitive solar year; only at the utmost an association of the former with the latter: so that after a time both might be found in existence and both going on together in particular instances in which they had not been so doing before; a civil solar year regulated by the law of the equable revolution of annual calendar in natural annual time, and a lunar regulated by the law of the Apis cycle; which in fact would be the same thing as the former under another name.

The question then which would require to be considered here would be whether this natural combination of primitive lunar time with primitive equable or solar must be supposed to have made part of the calendar from the first? in other words, whether this property of the equable year, which predisposed and qualified it so remarkably to be the constant measure of lunar as well as of solar time, was known to mankind from the first? And to this question we could return no other answer at present than that which we have already returned[i]; viz. That in all probability it was: and that this truth was one of the instincts of rational and human nature,

[h] Diss. iii. ch. iii. sect. ii.

[i] Supra, loc. cit.

familiar to the minds of the first pair of human kind from the very moment of their birth: though, like many other truths, much more important than this, and much more likely to be permanently remembered because of their superior importance, it might afterwards be lost to their descendants; and if recovered at all must be so by a subsequent and so far an original discovery, made by men for themselves and at a much later period of their existence and in a very different way.

With the reader's permission however we will suffer this question to stand over for the present, until we are better prepared to enter upon it. The fact will still hold good, that the first evidence of the actual incorporation of the eikosipenteteris in the civil reckoning of equable solar time meets us in the history of the equable solar calendar of ancient Egypt, and in the rise of the proper Apis cycle of the Egyptians; the date of which it is in our power to fix with absolute certainty to the 11th of the primitive Thoth Æra Cyclica 3034, May 1 B. C. 973: and which we are also able to trace from that time forward through three other types of this cycle, one substituted for another from the necessity of the case, down to A. D. 362 in the reign of the emperor Julian.

The next type of the Apis cycle, similarly engrafted on the preexisting equable year, which our inquiries bring to light, appears among the Babylonians, or the Chaldeans of Babylon; much later indeed than this Egyptian one, yet very near the beginning of the oldest æra among the Babylonians themselves, the æra of Nabonassar, commonly dated by chronologers on Feb. 26 B. C. 747. The date of this second type of the Apis cycle, (the type peculiar to Babylon or to the Chaldeans of Babylon,) was Thoth 1 Æra Cyc. 3261 Nab. 2, Feb. 25 B. C. 746: and it was characteristic of it that, for a particular reason, it was appointed to bear date from the full moon, not from the new. But this made no difference to the nature of the cycle. We are able to trace this Babylonian type of the Apis cycle down to the time of its transition into a second, the date of which was the luna secunda, October 2 B. C. 306.

The next type of this Apis cycle, and distinct from either of the preceding, meets us among the Chinese, and

in connection with the first introduction of the cycle of 60 days also into that country. Of this we have already given some account. Its epoch was the luna prima, Thoth 2, Æra Cyclica 3265, Feb. 25, B. C. 742.

The fourth type of the same kind of cycle, which is also discoverable, associated in a similar manner with the preexisting equable solar year, occurs in a very different part of the world, and applied to a very different use and purpose from that to which any of the former could possibly have been subservient; in the "Ducenarium" or Paschal period of 200 equable years, eight cycles of this description, compiled by Andrew of Byzantium or Constantinople for the use of the Armenian church soon after the conversion of the nation; and intended for the regulation of Easter, and of the rest of the festivals of the Christian church of Armenia. Its date was the lunar 14th, Navasardi 9 Æra Nab. 1100, Sept. 9 A. D. 352.

Lastly, if we are not much mistaken in our conclusions from the facts which have come to our knowledge, the same cycle is also to be met with in Spanish America, virtually if not actually combined with the lunæsolar period of 312 years peculiar to the cyclico-Julian correction of those countries. And in that state of conjunction with this period it appears to have taken its rise among the Toltecs, attached to the first of Thoth, Nab. 1448, March 1, A. D. 700, which coincided in that year with the luna 6[a]; the natural lunar epoch of this period of 312 years. And from the Toltecs it passed in the course of time to the Aztecs.

SECTION II.—*The lunar mansions.*

We may take our leave of this part of our subject with one more observation. Though it is not proper to reckon the original division of the lunar mansions of antiquity among the lunar corrections of the primitive solar calendar, or in fact to reduce this division under the category of lunar corrections at all; yet since it was nominally a lunar distinction of time, and was actually engrafted at first on the primitive solar year as much as any thing the most strictly and properly lunar of later date; it may not be uninteresting to the reader to be apprized that, simply as a division of

lunar time in any sense, next to the Apis cycle this is the most ancient which the history of time brings to light. This is the first nominal division of lunar time in any manner of which we can safely undertake to say it was conceived and executed by men for themselves. And this too took its rise in Egypt; and in Egypt it was as old as the introduction of the Julian year and the first idea of the Phœnix cycle; and it was attached to the same epoch as this cycle itself, as we hope to explain more fully hereafter.

SECTION III.—*The τριακονταετηρὶς or 30 years' period.*

Among the other properties of the equable solar year, that of bringing back the same lunar and the same solar dates, if not to an absolute identity one with the other, yet to a certain and determinate proportion one to the other, at the end of every 30 years, is one. It follows that there is a lunæsolar period of 30 years, peculiar to the primitive year, as well as one of 25 years; a τριακονταετηρὶς as well as an εἰκοσιπεντετηρίς. Three hundred and nine lunations in sequence, (the number which enter perpetually into 25 equable solar years,) bring back the same lunar to the same solar dates, and *vice versa;* three hundred and seventy one, the nearest number contained in 30 equable solar years exactly, bring back the same lunar dates not indeed to the same solar as before, but to the same increased by six; that is, to the same dates in proportion; the same dates six numbers higher.

This property of the equable solar year being known, it would manifestly be possible to found upon it a continuous reckoning of lunar time in terms of equable solar, and *vice versa;* and one which should return to the first principles of the relation of one of these to the other, whatsoever that might be, in five cycles of 30 years, or in one lunæsolar period of 150 equable years. Now this property appears to have been discovered by some of the nations of antiquity, which, as far as we have been able to ascertain to the contrary, never penetrated into that of the Apis cycle. Among the former inhabitants of Europe at least, there can be no doubt that it must have become known to the ancient Druids; for this and this only is competent to explain two well known facts, relating to their opinions, or to their actual reckoning and

measurement of time; one, the length of their sæculum, a lunar period of 30 years, the other, the traditionary respect which they paid to the *luna sexta.* We have seen reason indeed to conclude that the first triacontaëteris of this description took its rise among them; and that the property on which it was founded must have become known to them more than 500 years before the Christian æra; the epoch of this first period of 150 years being attached to Thoth 1 Æra Cyclica 3493, Jan. 1 B. C. 514, which coincided in that year with the luna quinta or luna sexta.

We discover the traces of this same cycle of 30 years at a much later point of time, among the Veneti of classical antiquity, and among the Spaniards; as we hope to shew more fully hereafter. And in Spain it appears to have been ultimately the foundation of the well known æra, peculiar to that country, called the æra Hispanica; though on that point we would not speak with too much confidence at present. It was most characteristic however of the Druids, both of Gaul and of Britain: and to the Druids we do not hesitate to ascribe its discovery and its first application in the manner above described.

SECTION IV.—*The nundinal cycle.*

Nor can we conclude this account of lunar cycles or of lunar calendars, derived from the primitive solar calendar and associated with it, and accompanying it ever after in a certain state of relation to it and of dependence upon it, without again mentioning the nundinal cycle and the nundinal calendar of ancient Italy.

That this calendar was lunar, but of a particular kind, and that its proper cycle itself was a cycle of quarter lunations, has been explained. That it was derived too from the pre-existing solar calendar, the primitive equable one, in each of its forms but the last, (the nundinal correction of Romulus,) has been shewn also. We cannot however consider this particular modification of the lunar calendar a different thing from the primitive solar one in general. It will be demonstrated we hope in due time, that a lunar reckoning like this, and the primitive equable reckoning of solar time, must bear a determinate relation one to the other; so that the cycle

of such a lunar calendar as the nundinal, and the primitive equable cycle of annual solar time, having once set out in a state of conjunction of a certain kind, would go on afterwards, retaining the same kind of relation to each other perpetually. We hope too to be able to shew that even the decursus of secular periods, and the lengths of these periods, among the Hetrurians in particular, which constituted the most characteristic distinction of their proper type of the nundinal calendar itself, had their foundation in this connection and in this relation. But we reserve these points for the present.

Section V.—*The octaëteris.*

The octaëteris, or lunæsolar cycle of eight years, is a form of the lunar reckoning of annual time totally distinct from and independent of the reckoning of solar in the primitive equable year. It is a combination of annual lunar with annual solar in the sense of annual Julian time. The reader has been already informed [h], and scarcely requires to be reminded of so obvious a fact, that the standard of mean annual solar time, incorporated with this particular form of mean annual lunar, is that of the mean Julian year exactly; 365 days 6 hours of mean solar time. Such a lunæsolar cycle as this then could not be associated with the primitive solar year, like the Apis cycle. It might be substituted for it and supersede it; but it could not be combined with it nor coexist with it. It might be engrafted upon it, and might derive its origin from it; but it must take its place. It might borrow its point of departure, its radix or epoch, the proper lunar and solar term *from* which it must set out and *to* which it must return perpetually, in the first instance from the preexisting solar year; but that is all the connection which it could possibly have with it ever after.

The remark, which we made on the same occasion, upon the peculiar adaptation of the octaëteric form of the annual reckoning of lunar time to the Julian form of solar [i], is strikingly confirmed by the matter of fact, also adverted to at that time; viz. that no sooner does the principle of the Julian reckoning of annual time appear to have become

[h] Diss. iii. ch. iii. sect. iv.

[i] Supra, loc. cit.

known in a particular instance, but the octaëteric form of the lunar is presently seen to have become known also; and to have been already associated with this Julian form of the solar. Our business however, in this part of our work, is merely with the history of this cycle; that is, with the order, the derivation, the dates of the different types of the octaëteris, beginning with the oldest, which the history of the calendar brings to light; by their derivation in particular being understood the connection of each in its turn with the primitive solar year, or that of a later type of the same cycle with an earlier, which itself was so connected. Of cycles of this kind the number discoverable is great. We will take them in the order of time.

i. *The Cretan octaëteris, or octaëteris of Minos.*

The first of these types, and in our own opinion and belief the oldest which is any where to be met with, we have seen every reason to conclude is to be traced to the island of Crete as its birthplace; and is to be attributed to the celebrated king and legislator of Crete, whom the Greeks have called Minos. Its date was Sept. 13 B. C. 1261: and for a particular reason, which could not be explained at present without going into the history of the primitive calendar of Crete in general, and into that of the cyclico-Julian correction of that calendar, older even in Crete than this octaëteric correction of Minos, it was attached to the same lunar and the same solar date; in the equable style Athyr 16 Æra Cyclica 2746, in the Julian Sept. 13 B. C. 1261, the lunar 16[a] that year. The reader must accept of such general statements as these for the present. We hope to verify every thing which we assert in due time by particular proofs, if God permits. And the data which we have already collected for that purpose, and which we have lying by us, are competent to supply those proofs; are enough, (and more than enough,) to explain and confirm our statements.

We have met with no type of the octaëteris more ancient than this. The discovery of this cycle then, (certainly so among the Greeks,) seems to be due to Minos; and consequently the merit and praise of the discovery, such as it is, to belong to him. But there are other considerations besides

the antiquity of the cycle, and besides the originality of the discovery of it itself, which render this octaëteris of Minos on every account a memorable thing; circumstances of distinction so extraordinary, so important, so lasting in their consequences, and so extensive in their influence, that every thing else sinks into insignificance in comparison of them; and yet so little to be expected beforehand, so incredible if simply stated, that unless we were prepared to accompany and verify our statements at present by the necessary proofs, to mention them would only excite a prejudice against them.

ii. *The Delphian octaëteris; Pythian Ennead; or octaëteris of Philammon of Delphi.*

The next type of the octaëteris, which continued research and investigation into this point brings to light, is 39 years later than the preceding. And this appears to have taken its rise at Delphi, and to have been in fact the invention of Philammon of Delphi. And being connected in its origin with the Greek fable of Python and of the Grecian Apollo, it was also the first and proper type of the Pythian ennead or Pythian octaëteris.

The same remark may be made on this second type of the octaëteris among the Greeks as on the first; that the uses which it serves in other respects, besides its simple chronological value, are very great; and could not even be stated at present, in conformity to the simple matter of fact, without doing more harm to the cause of truth than good. Let us confine ourselves therefore to the chronological history and circumstances of this type. Its date was August 26, B. C. 1222, which answered in that year to the 7th of the primitive Athyr, Æra Cyclica 2785, and to the 8th of the lunar month: and Philammon appears to have attached it to this date, because it was not strictly a new and an independent type of its kind, but was ultimately derived from the prior and original type of Minos; B. C. 1222, the first year of the Delphian type, being the last year of the fifth cycle of the Cretan one; and August 26 the Julian date of the first year of the former being the Julian date of the eighth year of the latter also.

We may assert with confidence that of no cycle of this kind,

and of equal antiquity or even of inferior antiquity, is the actual existence better attested or more thoroughly authenticated than that of this octaëteris of Philammon of Delphi, or, as we may equally truly call it, this original Pythian ennead of primitive Hellas. We affirm too, without fear of contradiction, that it was known to Homer; and that the epoch if not the type of the cycle is recoverable even from Homer, in perfect accordance with the account which has just been given of it. We affirm moreover that the traditionary date of the capture of Troy itself was handed down and perpetuated by means of this cycle, in which it was registered from the first; and yet not exclusively in that, or through that, but also in terms of the primitive equable calendar for the time being: as we hope to demonstrate more at large hereafter, when the proper opportunity for so doing arrives.

We may take our leave of this second type of the octaëteris with one more observation; viz. that though in all probability suggested by the original discovery of the same kind made by Minos, and though grafted upon that itself in the manner which has just been mentioned, it cannot be considered independent of the primitive calendar even at the time of its origin; no more than the type of Minos: August 26, B. C. 1222, being the 7th of Athyr, as much as Sept. 13, B. C. 1261, the 16th; and Philammon having had as good a reason for fixing the epoch of his cycle at that time to Athyr 7, as Minos had before for fixing his to Athyr 16.

iii. *Parthenian ennead of the Bœotians.*
iv. *Carnean ennead of the Spartans.*

The third type of the octaëteris discoverable by us is the Parthenian ennead of the Bœotians; and this appears to have been derived from the octaëteris of Philammon, in the same manner in which that was from the octaëteris of Minos. The date of this Parthenian type at least was August 7, B. C. 1119; answering to the 8th, or last, year of the 13th cycle of the octaëteris of Philammon.

The historical circumstances out of which it took its rise have been transmitted to posterity; and we hope some time or other to have an opportunity of shewing their consistency with the above date. We hope also to illustrate the

connection of this more ancient cycle of eight years among the Bœotians with the similar cycle of later date, which was that of the first type of their lunar calendar, properly so called; as well as that of the Pythian ennead of Philammon of Delphi with the proper octaëteric cycle of the Delphian calendar also.

The fourth type of this cycle makes its appearance among the Spartans; and in this instance also the relation of the two shews it to be resolvable ultimately into the Pythian cycle of Philammon; and consequently not to have been something absolutely new, even in the shape in which it was now adopted at Sparta. We have seen every reason to conclude that it took its rise in the 7th year of the current cycle of Philammon, the stated date of which was August 18; that of the first year of this cycle ever after: and that the year in which it was instituted was either B. C. 1104, the 7th year of the 15th cycle of Philammon, or B. C. 1096, the 7th of the 16th. And if we are not mistaken too, the rise of this octaëteric type among the Spartans, and probably among the Doric communities of the Peloponnese generally, is connected with the institution of the Carnea, the most characteristic observance of those communities in general; and with the rule of the Carnean festival ever after.

The principle of this division and reckoning of time having once become known to the ancient Greeks, and many types of the octaëteris being actually in existence among them at once; it can be nothing surprising that allusions and intimations are still to be met with in classical Hellenic antiquity which imply the existence of even more types of the same kind in different quarters; though from the want of circumstantiality in such allusions we can do little more at present than suspect their existence. We are decidedly of opinion that there was one more type of this kind at least, indigenous to the island of Rhodes, and connected there with the origin of the fable relating to the Telchines; just as the original cycle of Minos was with that of the fable of the Curetes in Crete.

On these points however we can go no further into details at present. It is sufficient to have called the attention of the learned to such subjects. The intelligent student of

classical antiquity will now see a force and a meaning in much which before probably must have appeared to him unintelligible. The *annus magnus* of antiquity, as measured by the cycle of eight years, is now explained; and the year of the gods, as one year of this description, equal to eight of those of men, and the term of the ἀπενιαυτισμὸς, the period of banishment and exclusion from the society whether of gods or of men, the doom of gods or of heroes for particular offences, the measure of which was this cycle, acquire a propriety which they would not otherwise have [k].

v. *The εἰκοσιτετραετηρὶς, or 24 years' cycle, of Numa Pompilius.*

The Roman correction of Numa Pompilius, and its derivation from the primitive solar calendar in B. C. 712, have been illustrated already; as far as the nature of the case requires or permits at present. This correction was an εἰκοσιτετραετηρίς: a lunar calendar with a cycle of 24 years. Consequently it contained three cycles of eight years; three cycles of the octaëteris: and therefore, from the mere statement of this fact, it might very naturally always have been conjectured concerning it, that probably it was a particular form or modification of the simple octaëteris. This conjecture turns out to be right. There was no difference in principle between the εἰκοσιτετραετηρὶς of Numa and the simple octaëteris. The sum of mean time reduced to the standard of the period of 24 hours, that is of days and nights of uniform length, in one of these cycles of Numa and in three of the octaëteris was the same. The difference between this cycle of Numa and the simple octaëteris resided only in the details and administration of the cycle itself, which were not the same as those of the simple octaëteris; and in the art and contrivance whereby the same result was worked out at last in one of these cycles of Numa as in three of the octaëteris, but in a totally different manner.

We class this Pompilian correction, both of the primitive calendar and of the calendar of Romulus at one and the same

k Apollodorus, Bibliotheca, iii. iv. § 2. Strabo, xvi. p. 72. Hesiod, Theogonia, 800–804. Plutarch, Quæstiones Græcæ, cap. xii. Ibid. De Placitis, lib. ii. cap. λβ. Ælian, Var. Hist. iii. 1. Servius, ad Æneid. vi. 324.

time, (as the nature of the case seems to require we should,) with the other types of the octaëteris derived from the primitive calendar: with this observable circumstance of distinction between the rest, as far as we have yet discovered, and this, that though all those, as well as this, were derived, immediately or mediately, from the primitive calendar, not one, as far as we have been able to discover, was actually substituted for it but this. It is needless to add that a correction embodying the principle of the octaëteris, so made and introduced into actual use at Rome 666 years before the date of the Julian correction itself, implies that the principle of the Julian year was as well known to Numa Pompilius B. C. 712, as to Julius Cæsar B. C. 46.

vi. *Greek octaëteris of later times, or the Hellenic octaëteris properly so called.*

The phenomenon which the history of the Greek lunar calendar brings to light is very remarkable; and, had we not the means of accounting for it, it would be very embarrassing. It would present an insuperable difficulty. It would be like the absolute contradiction of one matter of fact by another. As it is, it is more curious than perplexing; more instructive than contradictory; more striking from the appearance of difficulty connected with it, than difficult to explain. It does more to illustrate the real march of discovery and of the progress towards perfection in a particular department of the knowledge of the ancients, hitherto involved in obscurity, and among so interesting a part of mankind as the early Greeks, than any other state of the case could have done.

If the facts which we have already laid before our readers have any foundation to rest upon, they are demonstrative that the idea of the octaëteris could have been no novelty among the Greeks more than 600 years before the time of Solon; and yet the ancients are unanimous in attributing to Solon the first introduction into use of the lunar calendar: and it is certain that the calendar introduced into use and established by Solon, in the first instance of all, was this particular kind of lunar calendar of which we have hitherto been speaking, the octaëteris, and nothing else.

On what principle then are we to account for two such seemingly different matters of fact, and for two such apparently different states of the case, as these? A perfect idea of the octaëteris among the Greeks 670 years before the lunar correction of Solon, and actual octaëteric types, one of them at least 669 years older than the lunar correction of Solon, and yet the octaëteris a new thing in the time of Solon? the lunar correction of the primitive solar calendar by Solon, (that which descended to posterity under his name, that which was the first of the kind among the Greeks, amounting to a change of the civil calendar previously in use,) the octaëteric itself?

Is it to be explained by supposing all traces of the knowledge once before possessed by the Greeks on this subject to have been lost, in the course of the interval between Minos and Solon; and not to have been recovered before the time of Solon, and probably by no one but Solon himself? This explanation is inadmissible; because there is proof at many points of the period between Minos and Solon that some one or other of the types of the octaëteris, which had been brought into existence successively in the course of this interval, was continuing still in existence and still in use during this interval; so that it would be impossible that the idea of the octaëteris, which had once been reduced to practice among the Greeks, and had once come to be rendered familiar to them, could ever have been totally lost by them again.

The true explanation of both these facts is that to which we briefly adverted, when we had occasion to speak of this particular cycle before[1]; viz. that the principle of the Julian year having once been applied to the actual measurement and reckoning of annual solar time, and the octaëteris having once been introduced and applied along with it, for the measurement and reckoning of annual lunar time; the latter for many reasons might continue to be retained as a constant standard and measure of solar time, even when it had lost all credit as one of lunar. We observed on that occasion, that the octaëteris is one of the most perfect and most convenient

1 Diss. iii. chap. iii. sect. iv.

measures of annual solar time in the sense of Julian imaginable; though proportionally as imperfect and inadequate a measure of annual lunar in the sense of natural. Time could add nothing to the eviction of its competency in the former respect from the first, while it would infallibly detect and expose its incompetency in the latter; and, when that discovery had been made, men must have been blind indeed to trust to it any longer for the reckoning of true lunar time, though they might still use it, if they thought proper, as a *conventional* reckoning of that kind; as still the same standard of *lunar* time merely in the sense of *calendar* lunar time.

In the mean while, between the time of Minos and that of Solon, the problem which occupied the attention of men was the correction of the octaëteris itself; or the mode of so using and applying it as to render it always available for the reckoning of true lunar time, without impairing its approved and well understood sufficiency as a constant measure of solar. The solution of this problem was the discovery of the period in the course of which the inherent defectiveness of the octaëteric lunar cycle is found to redress and to rectify itself. This discovery was certainly made between the time of Minos and that of Solon, though by which of the Greeks it is difficult to say; whether Harpalus, Nauteles, or Solon, (all of whom appear to have been more or less contemporaries,) or any others older than any of them: and it must have been strange if the collective sagacity of all the Greeks between Minos and Solon, and the united observations of 600 years and upwards, had not been found to have made it.

No one however, so far as any thing can be discovered to the contrary, appears to have availed himself of it for the actual correction of the calendar before the time of Solon. In the course of this long interval from Minos to Solon, it had come to be fully understood what the tendency of the true lunar dates to rise on the calendar dates in the octaëteric cycle actually was; what allowance was to be made for this tendency in successive cycles; and, by what system of accommodation of one to the other perpetually, it might be possible to combine in the very same cycle a lunar and solar reckoning which should be nominally fixed and invariable, and a lunar and solar reckoning which should always be

moveable in comparison of the other, but only within certain limits, and always be true to the moon. Such a combination having been once effected, it would be possible to make use of either kind of reckoning, and in the very same cycle too; and, while certain dates for particular reasons should always be shifting their place in the cycle and following the moon, others to which no such necessity applied should remain undisturbed, and be nominally always the same.

Now this appears to have been the actual state of the case in the lunar calendar of the Greeks, octaëteric as it was, from the time of Solon downwards; though modern chronologers have not been aware of the fact. There was a double current of lunar time in such calendars, each coexistent with the other at once; one nominally and apparently always the same, flowing equably through every year and every month and every day of the cycle alike; the other nominally always varying, and rising perpetually in the calendar or solar reckoning in a certain proportion every cycle; yet in reality, as the actual current of lunar time, always the same, because always true to the moon. The religious feriæ, more particularly the most solemn and most important, the Panathenaic, the Olympic, the Pythian, and the like, in the Hellenic calendar so constituted, followed the moon in the manner described; and therefore they were constantly moving further and further onwards in the solar reckoning of the calendar, with every cycle. Ordinary terms and occasions, in the usual business of domestic life and even of public, in which there was no end to be answered by taking true lunar time strictly into account, were left to be regulated by the calendar, and by the ordinary reckoning of the calendar; consequently as true to the sun at one time as another; and nominally so to the moon, but in reality true or false in that respect, according to circumstances.

On these points however the time for particular explanations is not yet come. What we have stated is sufficient to remove the *prima facie* appearance of inconsistency between the supposed discovery of the octaëteris in the time of Minos and yet its introduction into the calendar first in the time of Solon. We must now resume the prosecution of our proper subject by briefly alleging the proof of this latter fact.

It is a very singular phenomenon, and a striking confirmation of the great truth for which we are contending, (the existence of a primitive calendar older than every other kind and variety of the civil reckoning of time any where, and the original source from which every other of later date is itself to be derived,) that among even the Greeks alone, beginning with the time of Solon, and in the year after his archonship, B. C. 592, (the first year in which an actual correction of the calendar, as one of the acts and proceedings of the legislature ascribed to him in the year of his archonship itself, could be expected to have come into actual use,) we find SIX types of the octaëteris taking their rise one after another, each on the *first day* of the primitive Thoth for the time being, and all 25 equable years asunder one from another; the first being the Attic correction of Solon, Thoth 1 Æra Cyc. 3415, Jan. 19 B. C. 592; the last the Macedonian, Thoth 1 Æra Cyc. 3540, December 20 B. C. 468. The importance of this fact and the inference deducible from it will be appreciated by the reader, if he recalls it to mind that 25 equable years were the measure of the Apis cycle; and that, from the necessity of the case, if there was a lunar conjunction on the 1st of Thoth Æra Cyc. 3415, Jan. 19 B. C. 592, (which was actually the case,) there would be a similar conjunction on the 1st of Thoth Æra Cyc. 3440; and so on for many cycles of 25 years in succession: any of which might be taken and constituted the epoch of a lunar correction of the primitive solar calendar at such times; and therefore of a lunar correction, directly derived from the primitive solar calendar itself.

This fact then is demonstrative that these different octaëteric types must have been adopted by the Greeks just 25 cyclical years one after another; and that the first having been fixed to the lunar conjunction on the 1st of Thoth, the second was fixed to the lunar conjunction on the 1st of Thoth too, as soon as by the law of the Apis cycle the same lunar date had been brought round to the same solar date again; and that this was done five times in succession, before there is any proof discoverable of the termination of the process. We say that under such circumstances the conclusion, for which we contend, in the case of the Hellenic calendar is

demonstrated. For as to resolving a coincidence like this in six different instances into *chance*, it is impossible; and no man in his senses, who was obliged to admit the fact itself, would think of accounting for it on any such principle as chance.

vii. *Arctöan or Northern octaëteris, and its different types.*

The next instance of the adoption of the octaëteris instead of the primitive solar calendar, on a large scale, meets us in the north of Europe; among the aboriginal inhabitants of a part of the world, which the Greeks and the Romans, in their ignorance of the truth and with the overweening idea which they entertained of their own superiority to the rest of mankind, would have styled the land of Barbarians above all others; though it is morally certain that upon all such points as the true science of time, (involving as it did the science of astronomy, and a great deal more which constitutes the real test and criterion of barbarism or of refinement,) there was quite as much proficiency at this very time among these Barbarians as among the Greeks; and much more than among the Romans.

The first type of this family in general bears date B. C. 365; in which year the ancient British, the ancient Gallic, the ancient Anglo-Saxon, the ancient Danish, and the ancient Icelandic calendars, (all absolutely one and the same with the primitive solar calendar until then,) passed simultaneously into this form of the lunar; taking their epoch from the same day of this primitive solar calendar, the date of the winter solstice in that year, Dec. 25; and from the *luna sexta*, which coincided in that year with the same day; and which, for the reason already explained[k], was preferred by these nations to any other lunar date.

The second, (at least we ourselves have discovered no intermediate one prior to this,) bears date B. C. 240; when the Cimbric, Teutonic, or Allemannic primitive equable solar calendar was superseded in like manner by the octaëteris; the epoch being taken in this instance directly from the 1st of the primitive Thoth, October 26; and in this instance also,

[k] Supra, section iii. p. 562.

as in the former, being attached to the luna sexta, dated from the phasis at least.

The third, which we have yet been able to discover, is the Helvetic. And this appears to have taken its rise on the 1st of the primitive Thoth Æra Cyc. 3934, Sept. 16 B.C. 74; but on the *luna prima*, not on the *luna sexta*.

Besides these, we meet in the ancients with general allusions to the existence of the octaëteric cycle among others of the inhabitants of the north of Europe; but they are not sufficiently specific to enable us to define the epoch of the cycle, though they furnish good grounds for supposing that the above list of northern types of the octaëteris is far from complete; and that, if the truth were known on this subject, the primitive calendar of all those regions in general might very possibly be found to have passed successively into this form of the lunar, derived in the first instance from itself.

It is superfluous to observe in all such cases, that each of them argues alike the same degree of light and knowledge concerning the mean Julian year; as the basis of the solar measure of time which entered into this cycle. It is clear then that all intellectual and scientific proficiency was not confined to the Greeks, much less to the Romans; that science and philosophy had their schools and their colleges among these *Barbarians*. As Scaliger remarks on a similar occasion[1], our ancestors were ζῶα λογικά; and had either retained more of the common stock of knowledge once inherited by all mankind, or had made a better use of their time and their talents in recovering what had once been possessed, and had subsequently been lost, by all, than many of their contemporaries among the Greeks themselves.

Section VI.—*The* 59 *years' cycle, or* ἑνὸς δέουσα ἑξηκονταετηρίς.

There is another lunæsolar period also known to chronologers; the measure of which in solar or Julian time is 59 years: and this is more true to the moon than the octaëteris, but not so true to the sun.

Among the lunæsolar periods of antiquity, derived from the primitive solar year, this too requires to be enumerated.

[1] De Emendatione, ii. 171. B.

Hellenic tradition ascribes a lunar cycle of this kind to Pythagoras, and also to Philolaus of Croton, a disciple of Pythagoras, or at least a philosopher of the school of Pythagoras; so that among the Greeks this might have been the peculiar lunar and solar period of the Pythagoreans; and for that reason, as an actual measure of lunar and solar time for civil purposes, it might be more frequent in Italy or Magna Græcia than any where else.

There are however but two cycles of this description, which, as far as we have been able to learn, are actually recoverable at present; one of them the Olympic cycle of Œnopides of Chios, the other the civil cycle of the calendar of Platææ.

It appears that in the year B. C. 544, as we apprehend, Œnopides of Chios set up a 59 years' cycle at Olympia, which the ancients describe as a parapegma or calendar digested in conformity to the principles and details of this peculiar period; expecting that the Eleans would have adopted it for the regulation of the Olympic games. The epoch of this cycle was fixed to the proper solar or Julian term of those games, according to the original constitution of Pelops, June 25; and therefore it was not taken directly from the preexisting equable calendar at the time; though, as attached to a date which was so derived originally, it might be said to have been virtually taken from it even then. It was true to the moon however, B. C. 544: and, through this common term of June 25, it was adapted both to the proper solar date of the Olympic feriæ, and to the lunar date which corresponded to it also.

With regard to the other case of the same kind; at the time of the third correction of the primitive solar Hellenic calendar, to which we alluded not long since together with the rest, (a correction which appears to have been generally and indiscriminately made at once almost in all parts of Greece where no such correction had yet taken place,) at this point of time, we say, when most of their contemporaries were correcting their calendar by substituting for it the third type of the Hellenic octaëteris, the little community of Platææ, for a reason peculiar to themselves, chose to correct theirs by substituting for it this cycle of 60 years save one, this ἑνὸς δέουσα ἑξηκονταετηρίς: fixing its

epoch nevertheless to precisely the same date as that of the third type of the octaëteris in question, the 1st of Thoth, Æra Cyclica 3465, Jan. 7, B. C. 542. It is in our power to demonstrate that this and this only must have been the cycle by which the Platæan calendar in particular was regulated from B. C. 542 down to B. C. 431 at least; in which latter year, just before the actual commencement of the Peloponnesian war, and the surprise of Platææ by the Bœotians, it was merged in the Attic; and the style of Athens became the style of Platææ also.

And with respect to the reasons which must have influenced the Platæans to fix on this particular lunar cycle; we should perhaps be much mistaken did we attribute their determination to any affectation of singularity. There is a tradition connected with this cycle which will probably serve to explain their choice; and though there was a time when like most others we should have been disposed, from the *prima facie* appearance and construction of such a tradition, to pronounce it a mere fable, unworthy of serious consideration; we have learnt to think differently of such fables, and to undervalue nothing of this kind at first sight, simply because of the mixture of fiction which appears externally in it. This fable of the Platæans, if we are not mistaken, (should the proper time for its explanation ever arrive,) will do more to illustrate the actual application and use of such traditions, than any thing else could do.

Now this tradition would carry back the origin of this peculiar cycle to the time of Dædalus, that is, to the contemporaries of Minos himself, the first discoverer of the octaëteric cycle among the Greeks: and it is not impossible that it might actually go as far back as B.C.1250 itself. And this would be a curious coincidence: for it would prove that the octaëteris had scarcely come into being and scarcely become known, before its peculiar defectiveness as a lunar cycle was known or suspected also; and before an attempt was made to correct it by means of a cycle of a different kind. We confess however, we should be more disposed to date the actual discovery of this lunæsolar period of 59 years considerably later; for example, B. C. 1014, when the 1st of Thoth, May 1, and the luna prima might have been treated as coin-

cident. But this is simply a conjecture. All that we can assume with probability respecting the origin of this cycle is, that it must be found at the distance of an even number of cycles of 59 years from the date of the Platæan correction, B. C. 542.

SECTION VII.—*The enneakaidekaëteris.*

i. *The sacred calendar.*

The Enneakaidekaëteris, as we have already explained[m], is the natural form of the lunar reckoning of annual time in conjunction with solar in the sense of Julian. It is the lunar cycle which nature designed to accompany the solar and Julian year, just as much as the Apis cycle to accompany the solar and equable year.

The appearance of a lunar reckoning in cycles of this kind perpetually is therefore an infallible argument of the discovery, or of a near approach to the discovery, of the simple Julian year. A perfect lunar reckoning of this kind at least, constantly repeated, supposes a constant reckoning of solar time, in the sense of Julian; that is nominally always Julian; but of Julian continually equated to natural. And forasmuch as the Julian year appears to have been known in Egypt even from so remote a date as the epoch of the Phœnix cycle, B. C. 1848–1847; it is surprising that no clear and unquestionable traces of the enneakaidekaëteris should be discoverable in that country down to B. C. 306: at which time it certainly does begin to appear in Egypt, though not in a native Egyptian form, but in that of the Macedo-Egyptian type of the Metonic calendar of the Greeks in general, of which we shall have to give some account by and by.

We could not undertake to say, on the strength of this fact only, that the lunar cycle of 19 years was not known to the ancient Egyptians. It is scarcely possible that they could have been ignorant of it, at least in theory; or though they might not have discovered it for themselves, that they should not have become acquainted with it either through their neighbours the Jews, who had it among them from B. C. 1511, or

m Supra, Diss. iii. chap. iii. sect. vii.

by means of the commerce and communication carried on between Egypt or parts of Egypt and India; where also this cycle was to be found, familiarly applied to the regulation of annual lunar time, from the date of B. C. 946. And indeed, as this communication between Egypt and India in ancient times seems to have been carried on principally between India and Thebes in Egypt; we may possibly see reason hereafter to conclude that, if the lunar cycle of 19 years was ever introduced into the calendar any where in Egypt, it was most probably at Thebes in Egypt; and ultimately as a consequence of this communication and connection with India. Still the ancient Egyptians might have their reasons for never making use of this cycle in practice, even though they were acquainted with it in theory; and as they did not think proper to substitute the Julian year for the primitive equable solar year of their country, it was only consistent that they should never have thought of superseding the natural lunar cycle of that year, (the Apis cycle,) by the Metonic, or by any other.

The Sacred calendar indeed, i. e. the civil calendar of the people of God, from the time of their settlement in the Holy Land, was lunar; and the cycle of this lunar calendar was the enneakaidekaëteris. It was consequently the first and the oldest instance of the actual application of this cycle to the regulation of civil or calendar time; for we may venture to say without fear of contradiction, that nothing of the same kind is capable of being discovered in any part of the world, more ancient than this. Nor is there the least reason to suppose it was borrowed from the Egyptians, and not rather directly derived from an independent and probably an infallible source; a source the most worthy of the perfection of the calendar itself, with which there is nothing in all antiquity deserving to be compared, until we come down to the times of the lunar Metonic corrections among the Hindus, the Japanese, the Chinese, or the Siamese; nothing at least (not even in those other instances) which combined so much simplicity and perspicuity in the principles of its construction, with so much facility in its application, and so much regularity and efficiency in its details and administration.

ii. *Hindu enneakaidekaëteris.*

The oldest form of the cycle of 19 years, distinct from this sacred calendar and later than it, which presents itself to our researches, is the ancient Indian or Hindu. The Indian or Hindu calendar was corrected or modified on the cyclico-Julian principle in B. C. 1306; and its epoch was fixed at that time to the 17th of the primitive Athyr, Æra Cyc. 2701, answering to Sept. 25 B. C. 1306: and for three periods of 120 years, or 360 years in all, it continued to be administered without interruption on the purely cyclico-Julian principle.

But in the year B. C. 946, at the beginning of the fourth period of this kind, (or in the course of it,) the administrators of the calendar whosoever they were, having conceived a particular purpose which required the head of their calendar to be transferred from Sept. 25 to March 22, and having meanwhile discovered or become acquainted with the Metonic cycle of 19 years, 13 of which in succession are just equal to one lunæsolar period of 247 years, discarded the cyclico-Julian rule of the calendar; and after advancing the epoch first of all from Sept. 25 to Oct. 1, in order that the new administration of the calendar might set out on the luna septima, they began to regulate it by this Metonic period of 247 years; setting the epoch forward 29 or 28 days at the end of every one of these periods. And having steadily kept their original object in view, and having regularly administered the calendar agreeably to the rule prescribed, for 1483 years, (which every one must allow to be a wonderful instance of patience and perseverance in the same course of proceeding, under all circumstances and through all impediments alike,) they accomplished their purpose at last by the correction finally administered to the calendar A. D. 538; whereby the head of the calendar was left attached to March 22, the desired term up to which they had been labouring to bring it all the time.

Such is the account which Mr. Bentley has given of the successive corrections of the Hindu calendar from B. C. 946 to A. D. 538; and from the evidence of the fact itself. We have seen reason to conclude that this account is strictly agreeable to the truth. Nothing is necessary to complete it,

except to assign the reason why the process began in B.C. 946; and why it set out from October 1 in that year, instead of from any other date; and this Mr. Bentley was not able to explain, because he was not in possession of the true history of the same calendar up to that point of time. It is in our power however, we thank God, to supply this desideratum: and at a future stage even of the present part of our work, if we are permitted to reach it, we shall have occasion to do so more in detail. The Indian writers themselves, like the Chinese and others, would make us believe that the antiquity of their calendar knows no bounds; and in good truth it goes back to the beginning of things; but so does every calendar in the world besides. As a distinct thing from the primitive equable calendar, it had no actual existence before B.C. 1306. It is one of the most ancient corrections of the primitive calendar any where discoverable out of Egypt; yet not an original one, i. e. not one of which the Hindus of antiquity first conceived the idea themselves: for there can be no doubt, from circumstantial evidence of the most critical kind, that the first idea of this Hindu correction itself was borrowed from Egypt.

iii. *Enneakaidekaëteris of the Chinese, of the Japanese, of the Siamese.*

One of the next types of the enneakaidekaëteris, which our researches bring to light, is the Chinese of the date of Feb. 16 B.C. 657; of which we have already given a sufficient account for the present. The correction of their calendar, which then took place, certainly made it Metonic; subjected it at least to a Metonic cycle of 19 years. It has had such a cycle ever since, and it still has it; and though this is not actually the same at present as the cycle of 19 regularly brought down from this epoch of B.C. 657, we are able to prove, if we are not mistaken, even from the testimony of the Chinese themselves, that it was so at first; and that the difference which now exists between the original cycle of this kind and the actual one is accidental.

With this Metonic correction of the Chinese calendar we may class that of the calendar of Japan, which is three years older; Feb. 19 B.C. 660. Another clear and unques-

tionable case of the same kind is the Siamese correction, Nov. 29 B. C. 545. On neither of these two corrections however in particular is it our intention to enlarge at present. It is sufficient to have mentioned them, and to have assigned their proper place and time in the order of the historical review which we are instituting.

iv. *Hellenic enneakaidekaëteris, or Metonic cycle properly so called.*

If there is any one form of the cycle of 19 years in which it deserves the name of Metonic more properly than in any other, it must be that in which it issued from the hands of the discoverer of this cycle among the Greeks, Meton the Athenian, the son of Pausanias.

Now it is peculiar to this original cycle that it makes its appearance first in the shape of a correction of the preexisting lunar cycle, the octaëteris of Solon; and of the first such correction of it which had ever yet been proposed. It is peculiar to it also that it was made public by Meton with such an object in view in B. C. 432; that is, just at the end of the first natural period of the octaëteric cycle in the calendar of Solon; just as the first 160 years from the date of the correction of Solon, B. C. 592, were come to an end.

The simple statement of this fact is sufficient to prove that Meton must have chosen this time on purpose; as the fittest for such a correction of the calendar as he was proposing, because the most natural. It is not to be expected however under such circumstances, that this second correction of the calendar of Athens should be found to have been derived from the primitive solar calendar, just as the original correction of Solon had been. It is enough that it was so *virtually*, and through the correction which it proposed to supersede. Any further account of this correction either at Athens or any where else in Greece, we reserve for the present.

v. *Enneakaidekaëteris of the Arabians.*

Two clear and unquestionable cases of the derivation of the lunar Metonic cycle from the primitive equable calendar, and of the substitution of the former for the latter, meet us among the Arabians; one in the lunar correction of the

calendar of Mecca, attached to the first of the primitive Thoth Nab. 1131, May 20 A. D. 383; the other in the lunar correction of the calendar of Medina, which was previously cyclico-Julian; the epoch of which lunar correction was taken from that of this cyclico-Julian correction of prior antiquity; March 22 A. D. 383.

Thus both these Arabian lunar corrections took their rise in the same year. Each was substantially the same as the other. Both went on in conjunction ever after; both were older than the calendar of Hej'ra: and from these two, as we hope in due time to demonstrate, the calendar of Islamism itself, which follows nothing but the course of the moon and the succession of lunar phases, and even the calendar of Hej'ra, which is the same course and the same succession subjected to a conventional and positive rule, are ultimately to be derived.

vi. *Enneakaidekaëteris of Abyssinia.*
vii. *Enneakaidekaëteris of Peru.*

The lunar calendar of the Abyssinians, on which their Ecclesiastical computus is founded, appears to have been Metonic from an early date; and even while their civil calendar itself was still the primitive solar one. We have it at least in our power to trace the same cycle through three different types or states of its being, from Sept. 22 A. D. 792, to Sept. 16 A. D. 1441; each of them obtained from the same primitive solar year, and by a similar method of derivation; and the last of them only attached to the Julian correction of the primitive calendar among the Abyssinians; which, as we have already stated, was finally made in A. D. 1436.

There is reason also to believe that the cycle of 19 years was incorporated in the Peruvian calendar, A. D. 1444 or 1463; and very probably in the shape of an original correction, the work of one of the Incas of Peru, surnamed, for that and for similar services which he is said to have rendered to the calendar, "The Reformer of Time." So well founded is the observation of Delambre, That wheresoever men have watched the heavens with sufficient attention, there the discovery of this cycle has been made by them at last.

SECTION VIII.—*Lunar calendar of the Toltecs and of the Aztecs.*

The cyclico-Julian correction of the primitive equable calendar in Spanish America, (among the Toltecs at least first, and among the Aztecs or Mexicans afterwards,) had a peculiar lunar system engrafted upon it; of such a kind that the standard of the lunation for the use of the calendar was assumed at 26 days only. And these 26 days were divided into two halves, of 13 days each; that being the measure of one tonalli, or Mexican week. One of these half-lunations was called the *wake* or *vigil* of the moon, during which it was supposed to go on increasing to the full; the other the *wane* or *sleep;* from the full to the end of the month. Such a system of lunar time it is manifest could not have been regulated by any known cycle. It must have been *sui generis;* directed to ends of its own, and governed by rules of its own. We can divine indeed in all probability the principle on which it was founded; and why it was thus supposed necessary to leave a certain number of days out of every lunar month. We can connect it in its origin too with the primitive calendar; and with the first correction of that calendar among the Toltecs in particular. We can connect it also, through the lunæsolar period of 312 years which we have already mentioned[n], with the natural lunar cycle of the primitive solar year. But the most striking circumstance about it is the analogy which it exhibits to the original division of the lunar mansions; which as we shall see in due time hereafter was connected from the first with this week of 13 days, two of which in succession perpetually made up this calendar Toltec or Aztec lunar month. At present however it would be premature to enter on any further explanation even of such singular coincidences as these, and in parts of the globe so distant from each other, as Egypt and Spanish America.

SECTION IX.—*Recapitulation of the above review; and synopsis of primary derivative calendars.*

To sum up therefore the preceding statements in the most general terms.

The first and original form of the civil calendar every

n Supra, p. 561.

where was the equable solar. The calendars at different times engrafted upon this, associated with this, incorporated in this, or substituted for this, were either solar also, or lunar. The solar were either the Julian or the cyclico-Julian. The lunar were either the Apis cycle of 25 years, or the cycle of 30 years, or the nundinal cycle of 6 years, or the octaëteris, or the cycle of 59 years, or the cycle of 19 years.

These explanations having been premised; we shall subjoin a synopsis or list of these derivative calendars in general, arranged in the order of their derivation, i. e. of their coming into being—so far as we ourselves have yet been able to discover.

Synopsis of primary derivative calendars in their most general types.

Type		Æra Cyclica.	Midnight.	Æra of Nab.	Midnight.	B.C.	Midnight.	
i	Phœnix calendar of the Egyptians, Julian	2159	Thoth 1	....	....	1848	Nov. 18	Nov. 17
	Calendar of Mazzaroth, Julian -	2159	Tybi 7	....	....	1847	Mar. 24	Mar. 23
ii	Mneuis calend. of the Egyptians, Julian	2326	Thoth 1	....	....	1681	Oct. 9	Oct. 8
iii	Sothiacal calend. of the Egyptians, Julian	2657	Thoth 1	....	....	1350	July 22	July 21
	Isiac calendar of the Egyptians, Julian	2657	Athyr 17	....	....	1350	Oct. 6	Oct. 5
iv	Panathenaïc calend. of Erichthonius, Jul.	2661	Thoth 1	....	....	1346	July 21	July 20
v	Indian correction, cyclico-Julian -	2701	Athyr 17	....	....	1306	Sep. 25	
vi	Eleusinian calend. of Eumolpus, Julian	2701	Athyr 17	....	....	1306	Sep. 25	Sep. 24
	Thesmophorian calendar of Triptolemus, Julian - - - -	2701	Athyr 17	....	....	1306	Sep. 25	Sep. 24
vii	Cyprian correction of Cinyras, cyclico-Julian: calendar of Cilicia: calendar of Pamphylia - - -	2705	Athyr 17	....	....	1302	Sep. 24	
	Arabian correction, type i, cyclico-Julian	2705	Athyr 17	....	....	1302	Sep. 24	
viii	Phrygian correction of Midas, cyclico-Julian: calendar of Troas: calendar of Lydia - - - -	2705	Pachon 26	....	....	1301	Mar. 31	
ix	Cretan correction, cyclico-Julian -	2706	Athyr 17	....	....	1301	Sep. 23	
x	Siamese correction, cyclico-Julian -	2742	Athyr 17	....	....	1265	Sep. 14	
xi	Octaëteris of Minos - -	2746	Athyr 16	....	....	1261	Sep. 13	
xii	Olympic calendar of Pelops, Julian -	2746	Epag. 1	....	....	1260	June 25	June 24
xiii	Dionysian calendar of Melampus, cyclico-Julian - - -	2777	Athyr 16	....	....	1230	Sep. 6	
xiv	Octaëteris of Philammon, or Pythian ennead - - - - -	2785	Athyr 7	....	....	1222	Aug. 26	
xv	Cal. of Salamis in Cyprus, cyclico-Jul.: calend. of Byblus: calend. of Batnæ	2785	Athyr 17	....	....	1222	Sep. 5	
xvi	Lycian correction, cyclico-Julian -	2789	Athyr 17	....	....	1218	Sep. 4	
xvii	Calendar of Gaza: calendar of Ascalon: cyclico-Julian - - -	2809	Athyr 17	....	....	1198	Aug. 30	
xviii	Thracian correction, type i, cyclico-Jul.	2825	Paüni 25	....	....	1181	Mar. 31	
xix	Calendar of Heliopolis or Balbec, cyclico-Julian - - -	2833	Athyr 17	....	....	1174	Aug. 24	
xx	Calendar of Ninus, cyclico-Julian: calendar of Media - - -	2869	Athyr 17	....	....	1138	Aug. 15	

Type		Æra Cyclica.	Midnight.	Æra of Nab.	Midnight.	B.C.	Midnight.	
xxi	Julian correction of Babylon -	2901	Athyr 17	....	....	1106	Aug. 8	Aug. 7
xxii	Nundinal cal. of ancient Italy, type i	2907	Thoth 1	....	....	1100	May 22	
xxiii	Calendar of Amida, cyclico-Julian -	2909	Athyr 17	....	....	1098	Aug. 6	
xxiv	Apis cal. of the Egyptians, type i	3034	Thoth 11	....	....	973	May 1	
xxv	Syrian correction, cyclico-Julian	3045	Athyr 17	....	....	962	July 4	
xxvi	Bactrian correction of Zoroaster, cyclico-Julian - - -	3060	Thoth 1	....	....	947	Apr. 15	
xxvii	Samothracian correction, Julian -	3073	Athyr 17	....	....	934	June 27	June 26
xxviii	Julian calendar of Egyptian Thebes: calendar of the Temple of Ammon: calendar of Meroë: of Æthiopia -	3118	Thoth 1	....	....	889	Mar. 31	
xxix	Calendar of Sidon, cyclico-Julian; calendar of Berytus - - -	3118	Thoth 1	....	....	889	Mar. 31	
xxx	Nundinal calendar of ancient Italy, type ii, Etrurian - - -	3147	Thoth 1	....	....	860	Mar. 25	
xxxi	Tyrian correction, cyclico-Julian -	3174	Thoth 1	....	....	833	Mar. 18	
xxxii	Apis cycle of the Babylonians, type i	3261	Thoth 1	1	Epag. 5	746	Feb. 25	
xxxiii	Apis cycle of the Chinese - -	3265	Thoth 2	6	Thoth 1	742	Feb. 25	
xxxiv	Roman correction of Numa Pompilius	3295	Thoth 1	36	Thoth 1	712	Feb. 17	
xxxv	Persian correction of Gjemschid, cyclico-Julian - - -	3305	Phaophi 6	46	Phaophi 6	702	Mar. 22	
xxxvi	Japanese correction, Metonic -	3347	Thoth 15	88	Thoth 16	660	Feb. 19	
xxxvii	Chinese correction, Metonic -	3350	Thoth 12	91	Thoth 13	657	Feb. 16	
xxxviii	Hellenic Octaëteris, type i - -	3415	Thoth 1	156	Thoth 2	592	Jan. 19	
xxxix	Arabian correction, type ii, cyclico-Jul.	3425	Athyr 6	166	Athyr 7	582	Mar. 23	
	Thracian correction, type ii, cyclico-Jul.	3425	Athyr 6	166	Athyr 7	582	Mar. 23	
xl	Hellenic Octaëteris, type ii - -	3440	Thoth 1	181	Thoth 2	567	Jan. 13	
xli	Calendar of Emesa, calendar of Arca Cæsarea, calendar of Aphaca, calendar of Damascus, cyclico-Julian -	3450	Athyr 17	191	Athyr 18	557	Mar. 27	
xlii	Hellenic Octaëteris, type iii -	3465	Thoth 1	206	Thoth 2	542	Jan. 7	
xliii	Platæan calendar, 59 years' cycle -	3465	Thoth 1	206	Thoth 2	542	Jan. 7	
xliv	Punic calendar. Third type of fixation	3475	Thoth 1	216	Thoth 3	532	Jan. 5	
xlv	Hellenic Octaëteris, type iv -	3490	Thoth 1	231	Thoth 3	517	Jan. 2	
xlvi	Triacontaëteris of the Druids -	3493	Thoth 1	234	Thoth 3	514	Jan. 1	
xlvii	Hellenic Octaëteris, type v -	3515	Thoth 1	256	Thoth 3	493	Dec. 26	
xlviii	Hellenic Octaëteris, type vi -	3540	Thoth 1	281	Thoth 3	468	Dec. 20	
xlix	Armenian and Cappadocian correction, cyclical - - - - -	3545	Chœac 6	286	Chœac 8	462	Mar. 24	
l	Northern Octaëteris, type i -	3643	Phaophi 1	384	Phaophi 4	365	Dec. 25	
li	Calendar of Seleucia on the Tigris, cyclico-Julian - - -	3701	Paüni 1	442	Paüni 4	306	Aug. 8	
lii	Suevic correction, cyclico-Julian -	3710	Athyr 17	451	Athyr 20	297	Jan. 24	
liii	Northern Octaëteris, type ii -	3768	Thoth 1	509	Thoth 5	240	Oct. 26	
liv	Norwegian correction, cyclico-Julian	3773	Athyr 17	514	Athyr 21	234	Jan. 9	
lv	Bithynian correction, cyclico-Julian	3838	Athyr 17	579	Athyr 21	170	Dec. 24	
lvi	Cal. of Vacca. Sixth type of fixation	3868	Thoth 1	609	Thoth 6	140	Oct. 2	
lvii	Northern Octaëteris, type iii -	3934	Thoth 1	675	Thoth 6	74	Sep. 16	
lviii	Alexandrine calendar, Julian -	3981	Mesore 30	723	Thoth 1	26	Aug. 30	Aug. 29
						A.D.		
lix	Yucatan calendar, cyclico-Julian -	4197	Thoth 1	938	Thoth 8	190	July 14	
lx	Lunar calendar of Mecca, Metonic -	....	....	1131	Thoth 1	383	May 20	
lxi	Toltec correction, cyclico-Julian -	....	....	1448	Thoth 1	700	Mar. 1	
lxii	Cathayan and Iguran correction, Julian	....	....	1578	Thoth 1	830	Jan. 28	Jan. 27
lxiii	Peruvian correction, Julian -	....	....	1685	Thoth 1	937	Jan. 1	
lxiv	Araucan correction, Julian -	....	....	1769	Thoth 1	1020	Dec. 11	
lxv	Abyssinian correction, Julian -	....	....	2185	Thoth 1	1436	Aug. 29	

CHAPTER IV.

Section I.—*On the number of primary derivative calendars.*

The sum total of calendars solar or lunar, directly derived from the primitive, contained in the preceding list, is 65: and this might justly be considered a great number in itself, and sufficient to serve as the basis of a general induction to the effect which we have already explained[o]: especially as every calendar of modern times, every artificial, conventional, positive, in one word, civil measure of annual time, whether solar or lunar, which is in actual use at the present day, may be found comprehended in it; and being traced upwards from the present day to its source is resolvable into one of these primary derivative types at last.

Section II.—*Of the individual varieties and distinctions in the generic types of derivative calendars.*

It is certain however that, considerable as this list of primary derivative calendars may appear, it is far below the truth; and that the number of calendars so derived from the primitive calendar, actually once in existence, was much greater than the sum total exhibited in our synopsis. The reason of this may be briefly explained as follows:

i. Calendars must be regarded as distinct, which cities or communities in ancient times, altogether independent of one another, adopted without concert or mutual understanding; even though it happened that without proposing to themselves any such coincidence they fixed on corrections of such a kind as to be referrible to a common Julian type.

ii. Calendars must be considered distinct, whether adopted by different nations or cities in concert or not, whether characterized by the circumstance of a common Julian type of origination or not, which had different names for their respective months.

The reasonableness of these two propositions cannot be called in question; and, each of them being admitted, the

[o] Supra, Diss. vii. ch. i. sect. iii. p. 546.

number of primary derivative calendars included in our list will require to be greatly increased; because in the majority of instances the calendars there set down are not isolated specimens of their kind, not individuals *sui generis*, but types of a genus of calendars; representatives of a family of calendars comprehending many individual calendars. To each of these classes or families this type of origination, this Julian exemplar, which we have admitted into our list, would be applicable in common; but each notwithstanding must have had individual characteristics of its own, serving to discriminate it not only from the rest of the members of its own family, but even from the common type of origination itself. And among these individuating distinctions none was more general, nor more effectual for such a purpose, than the difference of the names of the months of the calendar in one of these instances, compared with the same in another; a circumstance which on account of its importance deserves to be specially noticed.

SECTION III.—*On the names of the months in the primitive equable calendar, and in the primary derivative calendars of antiquity.*

For with regard to these names of the months, (the *nomenclature* properly so called both of the primitive equable calendar and of primary derivative calendars,) the rule which we have found to hold good in general is *this*; That no where at first had the months any names of their own but those of order, as "the first," "the second," and the like: and, as every reader of the Bible cannot fail to have observed, this rule in the style of the Old Testament in particular is as old as the times of the Antediluvian patriarchs; and in fact may be said to be the proper idiom and the standing rule of Scripture from first to last.

There is every reason indeed to conclude that a solar calendar, possessing as yet no names for its months but these of order, is almost an invariable argument, an infallible test and criterion, of a revolving civil calendar; and that the first and most decisive indication of a calendar, which was previously cyclical, and had now become fixed, or was intended thenceforward to be fixed, in any manner and to

any extent, in comparison of what it had been before, is the appearance of proper names for the months in connection with it; and no longer merely names of order and number as before.

It follows consequently that, when cities or communities of old adopted a new form of the calendar whether solar or lunar, in contradistinction to their original cyclical one, provided it was only destined to be from that time forward a fixed and stationary calendar of some kind, and no longer a perpetually moveable one, they gave the months of this calendar for the first time PROPER names; and frequently too names which bore ever after their own testimony to the circumstances under which they were received, impressed in legible characters on the names themselves; having been taken directly from the relations of the cyclical to the natural year at those very points of time; and thereby serving ever after as an index of the kind and degree of coincidence, the absolute or the relative equality, prevailing at those very times between the civil and the natural standard of one and the same thing respectively.

But in all these instances they acted independently of each other; and often, as we have seen reason to conclude, with no other object in view except to declare that independence. And as they had to determine for themselves both the times when they should change their calendar, and the kind of correction which they should substitute in its stead, and what names they should give to the months; it could not fail to happen, and it turns out on inquiry almost invariably to have happened, that, even when cities and communities of old were correcting their primitive calendar at a common point of time, and even under circumstances of a common relation of their new calendars to the old; and consequently when, even without intending it, they could not fail to be pitching on the same Julian, the same cyclico-Julian, or the same lunar, type of the new as the proposed substitute for the old; and therefore when the abstract idea of these new measures of time, the general type or exemplar pervading them all, was sure to be the same: still they could not and did not agree in the choice of the names of their months. In this respect there was room *a priori* for the utmost diver-

sity. Every conceivable motive, reasonable or unreasonable, general or special, which can be considered capable of influencing the conduct of men under such circumstances, would be free to operate, and to determine the rule of proceeding in this particular case: temporary considerations, local peculiarities, religious prejudices, political partialities, random and capricious impulses, affectation of novelty of one kind or other, a spirit of contradiction towards their neighbours, and a thousand inducements besides, which might easily be imagined.

The consequence is that, even with such incomplete and inadequate means of judging of the extent to which this diversity of style in the calendars of old was carried, as are accessible to us at present, yet in this one article of their nomenclature the utmost difference is still seen to prevail; a difference of which no one can form a proper idea, whose inquiries have not been expressly directed to investigate it and to appreciate it rightly; but which would probably long since have been clearly perceived and duly estimated by learned men, if Callimachus' collection, entitled *Μηνῶν προσηγορίαι κατὰ ἔθνος καὶ πόλεις*, (which this very difference of which we are speaking in all probability induced him to compile,) had come down to posterity.

Now when calendars differed from one another in so essential a circumstance as this of the names of the months of which they made use; howsoever much they might agree in any other respect, they must be regarded *de facto* as distinct. In the popular view of their relation one to another, and in the mode of their working one in comparison of, and one in conjunction with, another, it is impossible but that they must appear distinct. And when we add to this the further consideration that though derived from the same original type, and possibly at the same time and in the same way, and retaining, it might be, a common family likeness of the same primitive type ever after, yet they were not derived from it in concert; each city, each nation or community, both as to the form of the new calendar which it chose to adopt, and as to the time when it chose to adopt it, was acting of itself and for itself: we need no more arguments to decide the question whether such calendars, agree as they might in the

abstract idea, or in the Julian type of origination, common to all, must nevertheless be considered and treated as so many different calendars, generically indeed the same, but specifically or individually distinct.

Now in the list exhibited above we have inserted nothing in each instance but the abstract conception, the Julian type and exemplar, of the correction. The specific differences, the individual varieties of this idea and of this type, in each instance, are not proposed along with it; but had they been so, it is certain that in many of these cases, if not in all, they would have been found to multiply the type over and over again. For example; there is every reason to conclude that the viiith in the synopsis, the Phrygian correction of Midas, was the general type of the civil calendar *not* in Phrygia only but in Troas and Lydia: That the xvth was common to Salamis in Cyprus, to Byblus in Cœlesyria, and to Batnæ in Osroëne, at least: and, to mention no more cases of this kind connected with the cyclico-Julian modification of the primitive calendar in particular, we have ascertained that the xxvth on our list, the Syrian correction as it is there styled, is the ultimate source of the modern Syrian calendar; and this circumstance alone must render it probable that, if there was one modification of the primitive calendar on the cyclico-Julian principle more common in Syria than another, it must have been this.

But the truth of the fact for which we are contending is most fully demonstrated by the testimony of the Greek octaëteris. We are in a condition to prove that the first type of this particular form of the lunar calendar derived from the primitive solar one among the Greeks, viz. the octaëteris of Solon, was adopted into public use at Athens, at Sparta, at Elis, and among the Ionic communities of Asia Minor, all at once. Yet who is not in the habit of assuming that the Attic calendar was a different thing from the Spartan, and both from the Elean, and each from the Ionic? And why so, except because the names of the months in any one of these calendars were notoriously different from those in the rest?

There was one of these types of the Grecian octaëteris, the xliid in our list, which bore date Jan. 7 B.C. 542; having been derived from the primitive solar calendar at that point

of time just under the same circumstances, and in the very same manner, as the first type of the kind, the octaëteris of Solon itself; and yet, as we are further in a situation to demonstrate, it must have been so derived and adopted *simultaneously* in almost every part of Greece: not only in Græcia Proper but among the Greek settlements, wheresoever they were to be found at that time; whether in Asia, or in the islands of the Mediterranean sea, or in Italy, or in Sicily, or in Africa; wheresoever, in short, Grecian communities were planted, which had not yet corrected their solar calendar by adopting either of the other two lunar types of the same kind in its stead.

It follows that if any type of the Greek octaëteris deserves the name of the Hellenic type κατ' ἐξοχὴν, it is this. This fact we say is capable of being demonstrated; and it will be demonstrated, we hope, in the course of our own Origines Kalendariæ. Yet amidst all that variety of individual forms of this common type, which thus sprang into being simultaneously, we have not succeeded in detecting any *two* in which the names of the months were the same throughout. We may judge therefore of the amount of *external* diversity, which was superinduced upon a real and substantial agreement beneath the surface, by this one circumstance of distinction; and it is but reasonable that all such cases of external disagreement in calendars otherwise the same should be treated and classed *de facto* as instances of a real distinction.

Nor was this state of the case peculiar to the Grecian octaëteris. The Arctöan or northern exhibits just the same phenomenon. The British, the Gallic, the Anglo-Saxon, the Danish types of the octaëteris were one and the same thing at bottom; similarly obtained from the same primitive solar year and at the same point of time too: and yet notwithstanding each was practically and individually different from the rest, because each had proper names for the months of its own.

It is evident that under such circumstances the list of primary derivative calendars which we have proposed in our synopsis, copious as it may appear, cannot represent the actual number of calendars which once existed: and each of

which at first stood in just the same relation to the primitive calendar of all antiquity, as the rest. Orders, genera, species may be defined and reckoned up and limited: individuals are innumerable. What the actual amount of calendars therefore, simultaneously or successively obtained from the same primitive type, may have been is one of those secrets which will never be known for certain: only that it must have been greatly out of proportion to that of those common abstract types, under which we have endeavoured to comprehend part of them at least in our own list.

CHAPTER V.

On Secondary derivative calendars, or calendars derivable from the primitive through Primary ones so derived.

SECTION I.—*On the ultimate transition of derivative calendars in general into the Julian.*

WE have not yet however done with this subject of derivative calendars. There is a numerous class of such calendars which may be traced up to the primitive calendar through those which have just been exhibited; and therefore which may be styled derivative calendars of the second order, as those may be, derivative calendars of the first order: *secondary* derivative calendars in contradistinction to *primary*. And this too is a point which deserves to be explained and made intelligible,

The history of the calendar, traced through these Origines from first to last, begins and ends with a phenomenon nearly of the same kind. It is a cycle of change and transition, setting out from a certain state of things at first, and returning nearly to the state, from which it set out, at last. It shews us at first an original simple and uniform calendar, solar in contradistinction to lunar, from which all others whether solar or lunar at different times afterwards derived their being: and it shews us again at last a residuary simple and uniform calendar, solar in opposition to lunar also, in which all these derived and intermediate states of the calendar, or nearly all, are seen in the course of time to lose

their individual being, and to be resolved into the form of this one at last.

That *primary* calendar was the solar and equable; this *ultimate* calendar is the solar and Julian. The assertion holds good in whichever way it may be stated: That all calendars distinct from the primitive, including the Julian itself, which ever actually existed, were originally derived from it; and, That all calendars originally derived from the primitive, distinct from the Julian, with very few exceptions have been finally resolved into the Julian. And as the resulting or ultimate state in such instances cannot but be considered something different from both the intermediate and also the original state and condition of the same things; we are justified in reckoning such final residuary states of the civil calendar every where, as so many fresh forms and varieties of the same kind of being; as so many affections of the same subject, individually indeed different from every mode and manifestation and qualification of its existence before, but generically the same with it. These too are derivative calendars, only of a second order; and ultimately are as much to be referred to the same common source and original as those of the first order: secondary derivative calendars, but still derivative as much as the primary, and from the same common stock of the primitive calendar itself.

SECTION II.—*On the transition of derivative solar calendars into the Julian.*

With regard to the causes of this resulting and final constitution of the civil calendar almost every where; it does not properly come within the scope of our subject to enter upon them: but we may be permitted to observe, That the ultimate and all controlling cause no doubt was the Providence of God, which contemplated thereby some end and purpose of its own not otherwise perhaps to have been answered; and which, as far as it is either allowable or possible for us to offer an opinion concerning it, was most probably connected with the introduction, the furtherance, and the establishment of the Christian religion, and with the general necessities of the Christian dispensation. But as to the mediate and the instrumental cause; it is easy to perceive that

it must have been due to the ascendancy of the Roman empire.

It is at least a remarkable coincidence that the calendar of Rome first became Julian, just at the same time when the empire of Rome became universal; as universal at least as it ever permanently became, and therefore we may suppose as it was destined to become. And the calendar continuing also to be uniformly Julian from that time forward, it could not fail to obtain that kind and degree of influence over the civil calendar every where else at last, which the calendar of the state sooner or later must acquire and must exercise over that of the subjects.

It is another singular coincidence that all the varieties of primary derivative calendars enumerated in our list, with very few exceptions, might be found simultaneously in existence, at this very time also, within the limits of the Roman empire. They were the actual civil calendars of cities or provinces or kingdoms, which composed the members and dependencies of the empire. It was to be expected *a priori* that they would be assimilated to the Julian sooner or later; as in point of fact they were: and that consequently the sole representative of the primitive calendar remaining in the world, the only one of that numerous offspring to which this calendar had given birth, still surviving to attest its parentage, and to perpetuate the existence of its parent in its own, in the course of time would be the Julian and the Julian alone.

It is obvious too that in many cases of these derivative calendars, coexistent at first with the Julian, those in particular of the most numerous family of all, the cyclico-Julian, there would be little or no difficulty in the process of their assimilation to the Julian. Such calendars were Julian already in principle; and might at any time be converted into Julian in effect and reality, with no other innovation on their previous rule and administration than simply the adoption of the Julian cycle of leap year.

And such in reality was the process through which in most instances they appear to have gone, in passing from the cyclico-Julian to the Julian state of their being. Without any change in the epoch of the calendar, the Julian rule of

administration and the Julian cycle of leap year were at once adopted; and the calendar became strictly and properly Julian. All that seems to have been considered a necessary preliminary to this effect, and consequently all that was done implying care and precaution of a certain kind, amounted to *this;* The selection of such a time for the change that the calendar might start in obedience to its new law from its recognised point of departure according to its former rule: and this being of course the Julian epoch of origination of the old calendar, no time could answer to that description so properly as some one or other of the periods of the stated correction of the old calendar on the proper cyclico-Julian principle of its administration; that is, some one of the epochs of the cyclico-Julian period of 120 years. Accordingly one of these appears to have been invariably selected for the purpose, wheresoever and whensoever it was practicable.

As to the question whether these derivative Julian calendars were to be assimilated to the proper Julian of the time, that is the Roman, in all other respects; as for instance to the proper Julian, in the sense of the Roman, rule of the reckoning of annual time, which would have required them to adopt the kalends of January as the first day of their civil year; or to the proper Julian, in the sense of the proper Roman, rule of the intercalary day, which would have required them to adopt the bissex in February every where, and to date their cycle of leap year universally from this month: this question, so far as we have been able to discover, appears to have been considered and treated every where as what it was in reality, a question of indifference, which every part of the empire was free to decide for itself.

We meet indeed with cases of the conversion of the cyclico-Julian into the Julian calendar, in which the beginning of the year was shifted to the kalends of January, and the Roman rule of the bissex was adopted at once; and the old calendar became to all intents and purposes a facsimile of the proper Julian or Roman from the first. We meet with cases in which one of these things was done, and not the other; as for instance in the transition of the cyclico-Julian calendar of Syria into the Julian, in which the intercalary day from the first was assigned to February, (i. e. to the month

corresponding to February,) but the beginning of the year was not transferred to January. In the majority of instances however, both the new year's day and the cycle of the leap year of these Julian calendars, derived from the preexisting cyclico-Julian, are seen to have differed from the proper Roman after the transition as well as before; and therefore they must have been left so to differ from the first. The difference was one which could not go beyond certain limits; and being stated and regular, once understood, it was easy to be taken into account whensoever it was necessary: for the Julian reckoning of such calendars was easily to be equated to the proper Julian or Roman, and by a very simple rule, perpetually.

SECTION III.—*On the transition of derivative lunar calendars into the Julian.*

With regard to the subsequent history of the lunar calendars of antiquity, after their first derivation from the primitive until these also were finally merged in the Julian, the course through which they ran, in many cases of the kind at least, may be briefly and summarily represented as follows.

The first form which these calendars assumed was the octaëteric; and in that shape and that state of their being they were ever after only one step removed from the primitive calendar itself. In some of these instances, as in the case of the octaëterides of the north of Europe, they appear to have continued in this form unchanged and without any subsequent variation from it, for a greater or a less interval of time; until they passed at last into the Julian calendar. We have not been able ourselves at least as yet to detect, in this class of derivative lunar calendars, any intermediate state of their continued existence, between the octaëteris and the Julian calendar, like that of the Metonic correction; though there may be reason to suspect something of this kind: nor would we undertake to say that no intermediate transition from the octaëteric to the Metonic correction took place in any of these instances, before the lunar calendar in any shape was laid aside for the solar in the form of the Julian; or that further and closer research into the antiquities of the north may not discover it.

We have actually ascertained something of the kind, in a case which to the inhabitants of our own island is or ought to be interesting in the highest degree; and which is closely connected with the very important question of the first introduction of Christianity into Britain. We have satisfied ourselves of the existence of a secondary form of the British and Irish octaëteris in particular, older, much older, than the transition of that calendar into the Julian; in the shape of the Paschal computus of the ancient British church. We have ascertained that this was a period of 84 years; composed therefore of the Metonic cycle of 19 and of the octaëteric of 8. It implied consequently an equal acquaintance with each. We have recovered this cycle also; and are in a condition to lay it before the world. The most extraordinary circumstance about it is that it is more than 300 years older than the arrival of Augustin in our island, and the conversion of the Anglo-Saxons. So much older then than either of those events does it incontestably prove that the first introduction of Christianity itself into Britain must have been. But we have not yet been able to satisfy ourselves that this period of 84 years, though as perfect a specimen of the class of cycles to which it belongs as any which ecclesiastical antiquity has to produce, was ever intended for, or ever applied to, any but religious or ecclesiastical purposes.

In the case of the Greek octaëteris and its several types, (which were by far the most numerous class of primary derivative calendars of that denomination,) all of them appear to have passed sooner or later through the intermediate state of the enneakaidekaëteris, before their final transition into the Julian.

We say however *sooner* or *later;* for it should always be kept in mind that the octaëteris had its peculiar period, 160 Julian years in length. And the ancients of this time of day were very well aware of that fact, though the moderns have not given them credit for being so. No instance can be discovered in which the lunar octaëteris, after having been once adopted among the Greeks instead of the primitive solar calendar, was allowed to be superseded by any other form of the lunar calendar until this period had run through its course, and had regularly come to an end, *once* at least: and

several instances are capable of being produced, in which, even when the Metonic correction had now come to be generally known and understood, and very generally received too, the octaëteris notwithstanding was purposely continued in use for another of its natural periods, if not for more. As for example, in the calendar of Delphi, in the calendar of Sicyon, and in the calendar of the communities which constituted the Achæan league: of each of which the fact which we affirm is certain.

In the particular case of the Attic octaëteris, the Spartan, and the Elean, (each of which came into existence at once, Jan. 19, B. C. 592, and all agreed in being expressions of the same Julian idea, copies of the same Julian exemplar, from the first,) this *first* period came to an end Jan. 19, B. C. 432. Now this year is the known historical epoch of the celebrated correction of Meton; published at Athens in this very year, only at or about midsummer, instead of midwinter: from which coincidence only, as we have already observed, were there no other proofs of the fact to be produced, it would still be clear to the conviction of any reasonable and unprejudiced mind, that Meton must have purposely selected this time for the publication of his correction, because it was the fittest *a priori* which could have been fixed upon, for discarding the octaëteris of the old calendar, and substituting his own enneakaidekaëteris in its stead: the first regular period of the former having just expired, and the next being only just begun.

It appears that, for the regulation of the Olympic cycle and of the Olympic feriæ, the people of Elis made no scruple to adopt this correction of Meton's as soon as it was proposed to them. But as to the Athenians, Meton's own countrymen, they hesitated about it at first; for the new calendar did not, and from the nature of the case could not, at this particular time when the octaëteris itself was again true to the moon, exhibit any such clear and decided proofs of its superiority to the old, that what had been sanctioned by so long a prescription, and was so interwoven with all the relations of public and domestic life, and especially was so closely connected with the services of religion as hitherto by law established, must all at once be given up and renounced for a

novelty of its kind, for an experiment as yet untried, however plausible, specious, and promising it might appear. Besides which, as the example of Aristophanes proves, there were many influential persons at Athens who were violently opposed to this change of the style or reform of the calendar in particular; and were so little inclined to favour it beforehand, that they could scarcely be reconciled to it even when the soundness of its principles had been tested by time, and when its superiority to the ancient rule of the lunar computation of the calendar had been approved and confirmed by the evidence of nature itself.

Be this however as it may, and be the reason of the fact what it may, the fact itself we do not hesitate to affirm is certain; that the true date of the adoption of the Metonic correction at Athens was not B. C. 432, the year of its actual publication, and the first year of the second period of the old octaëteris, but B. C. 425, the eighth. And yet it is still true that, when the Athenians did adopt it at last, they adopted not *a* Metonic calendar, a calendar simply constructed on the principle of the Metonic correction, and simply bearing date on the first of Hecatombæon, B. C. 425; but *the* Metonic calendar, the calendar already constructed on that principle, and already announced to the world on the first of Hecatombæon, B. C. 432, and administered meantime agreeably to that principle down to the first of Hecatombæon, B. C. 425: which was virtually the same thing as if they had adopted it from the first. And by a singular coincidence too it appears that only the next year, (the first year of the second cycle of the second period of their old octaëteris,) the Spartans also, though the Peloponnesian war was now at its height, adopted if not *the* Metonic calendar yet *a* Metonic calendar, a calendar constructed entirely on the principles of the Metonic correction; fixing the epoch of this new calendar, so constructed and so substituted for the old, to the first day of the tenth month in the first year of the second cycle of eight years in the second period of 160 years, dated regularly from B. C. 592 downwards, viz. October 11 B. C. 424: which they constituted also at the same time the beginning of their official year.

It is in our power to prove that the Metonic enneakaide-

kaëteris, having thus been established at Athens in B.C. 425, conformably in all respects to the first principles of the correction itself according to the views and arrangements of its own author, continued in use at Athens without any subsequent modification, any change or correction of later date whatsoever, down to A. D. 127 in the reign of Adrian; though learned men have almost unanimously taken it for granted that it must have been superseded by the Callippic correction of the Metonic itself sometime or other after B. C. 330. And in this year, A. D. 127, we are also in a condition to prove that, without laying aside their old lunar calendar altogether, (the vulgar Metonic correction so long before in use,) the Athenians adopted for the first time a proper Julian calendar: the epoch of which they took directly from the first of Boëdromion in the vulgar Metonic calendar, the same year, Sept. 4; but the cycle of its leap year, and in fact the details and rule of such a calendar in other respects, from the Julian calendar of Alexandria in Egypt.

This is the *first*, the *original*, the most *authentic*, if not the *only* authentic, type of the Julian calendar of ancient Athens. Other types of the same thing, attested by one sort of evidence or another, are to be met with. Our own researches have discovered five or six. But there is no sufficient proof in the case of any of these types but the first, that they ever had an actual existence; that they had ever any right to the name of the actual civil calendar of Athens. As far as we have been able to judge, all such types distinct from the first appear to have been not only later in the order of time than that, but contrived for and intended to answer purposes very different from that of the actual civil calendar; purposes purely scholastical, purely conventional among grammarians, sophists, and professors. Such types were intended for the schools, and were limited to the jurisdiction of the schools. They might pass for authentic, and might be well understood, in that sense, and within the limits of their own circulation; but no further.

As to the Julian calendars of the rest of the Greeks, derived from the lunar previously in existence among them, we could not conveniently give an account of all at present; but we may convey to the reader a general idea of the course

which the old Hellenic octaëteris, originally derived from the primitive solar year, actually ran through in most of these instances, before it was ultimately absorbed in the Julian calendar, by briefly detailing the matter of fact, as it appears to have held good of the two principal types of this octaëteris, the *Third*, the epoch of which was Jan. 7 B. C. 542, and the *Sixth*, the epoch of which was Dec. 20 B. C. 468: the former entitled to the name of the Hellenic octaëteris κατ' ἐξοχὴν, the latter, in its first and original state of derivation from the primitive equable year, the proper octaëteric correction of the Macedonian calendar, the first lunar type substituted for the primitive solar year in Macedonia; and so far, in its origin, the most obscure and insignificant as well as the latest of all; but from the fortune which awaited it destined to become in the course of time the most prominent, the most illustrious, the most influential and important.

The first natural period of the former of these types came to an end Jan. 7 B.C. 382; and there is no doubt that, among those Grecian communities which had been using this type exclusively until then, very many (though not all) must have discarded it from their calendar at this juncture of time, and must have substituted the Metonic correction in its stead: and also, (as was very commonly done in these times, in the first instance of such a change of the style as this,) that very many which adopted this change of style must have transferred the beginning of their official year from the winter solstice to the autumnal equinox. The Callippic correction of the Metonic cycle was published to the world in B. C. 330, 52 years after B. C. 382; and the Metonic cycle having been already adopted in such and such instances in B. C. 382, and the Callippic correction of that cycle (the only thing seemingly wanting to its final perfection) having also become known in B. C. 330; the first four cycles (that is, the first Callippic period of such a Metonic cycle reckoned from B. C. 382, not from B. C. 330,) would come to an end critically at the autumnal equinox B. C. 306.

Now it is here to be observed, that long before this time, (in fact, ever since the beginning of the reign of Philip the son of Amyntas,) the proper Macedonian calendar had come to acquire a preeminence, and to exercise an influence, among

the rest of the calendars of Greece, which was the natural consequence of the gradually increasing power of Macedonia, and of the personal ascendancy which the kings of Macedon had established for themselves over their contemporaries; an ascendancy carried to its utmost by the good fortune and successes of Alexander the Great. It is not surprising therefore that the calendar of Macedonia also should have kept pace with the political and personal influence of its kings; and should have risen to the same kind of distinction among the rest of the calendars of the Greeks; and should have every where established a circulation of its own, independent of and paramount to every other of the kind, of which there is no similar example to be produced in ancient times except that of the ascendancy of the Julian calendar within the limits of the Roman empire; nor any in modern times except that of the calendar of Hej'ra, wheresoever the religion of Mohammed is professed.

Now the first natural period of this Macedonian octaëteris also came to an end at the winter solstice B. C. 308; and very near the autumnal equinox in the second year of the second period of this calendar, in the first year of the second Callippic period of all those individuals of the third type of the octaëteris which had passed into the enneakaidekaëteris in B. C. 382; in this year, B. C. 306, we say, and at this time of the year, within less than a month of the autumnal equinox, the battle by sea off the island of Cyprus, which had just been fought; the assumption of the crown and of the style of king by Antigonus, as the immediate effect and consequence of that victory; the simultaneous assumption of the regal style and regal insignia by the rest of the Diadochi, by Ptolemy Lagi in Egypt, by Seleucus Nicator in Syria, by Lysimachus in Thrace, and by Cassander in Macedonia; the rise of FIVE kingdoms among the Greeks, all in a moment as it were; these events, we say, happening together and at this time, constituted a combination of extraordinary circumstances such as was never witnessed before, nor has ever been witnessed since: and certainly was unexampled and unprecedented in the annals of Greece since it had become a nation.

We cannot therefore be surprised at the discovery, if it

turns out that the same point of time is an equally memorable epoch in the history of the Greek calendar in particular; that this year, B. C. 306, is the date of the FUSION of the third type of the Hellenic octaëteris previously converted into the enneakaidekaëteris, now ready to set out on the decursus of its second Callippic period, with the sixth type, the Macedonian in particular, similarly conformed to the Metonic correction, and just entering also on its first Callippic period too; that as it was naturally to be expected the Macedonian type absorbed the Hellenic, not *vice versa;* that the Greeks of Asia Minor out of compliment to Antigonus, and the Greeks of Syria out of compliment to Seleucus, and the Greeks of Egypt and Libya out of compliment to Ptolemy, adopted in this very year the proper Macedonian dates of the calendar, and many of them even the Macedonian names of the months instead of their own; that consequently from this time forward THREE types or forms of the Macedonian calendar are discoverable in being at once, each regulated by the Callippic correction of the Metonic cycle, but one of them peculiar to Asia Minor, another to Syria, and the third to Egypt and to the Pentapolis of Libya; which we can find no better mode of designating and of discriminating one from another by a proper name in each instance, than that of calling the first of them the MACEDO-HELLENIC, the second the MACEDO-SYRIAN, the third the MACEDO-EGYPTIAN, Metonic calendar respectively.

The date of the first of these types was Oct. 1, B. C. 306; that of the second Oct. 30; that of the third Nov. 2. And it is a remarkable circumstance that whereas both the former were taken directly from the proper Macedonian lunar calendar, and were sufficiently true to the moon at the time; the last was taken from the Egyptian cycle of Apis for the time being; and therefore was attached to the lunar epoch of that cycle at this time: which both at this time, and ever since B. C. 728, was and had been not the luna prima or change, nor the luna secunda or tertia (the phasis), but the luna quinta dated from the change, the luna quarta dated from the phasis.

It is another curious coincidence also, (but the history of time is full of singular discoveries hitherto totally unknown,) that whether this Macedo-Egyptian epoch was taken from

the Apis cycle by Ptolemy Soter himself or by his Macedonian subjects in Egypt on purpose to please the Egyptians, and to humour their religious prejudices and partialities, which is most probable; whatsoever was the motive to this condescension and accommodation on their part to the national superstition of the Egyptians, it produced a corresponding effect on the part of the Egyptians themselves. It led to a reciprocal accommodation by them of their Apis calendar itself to this Macedo-Egyptian one. For it is not more certain that B. C. 306 is the epoch of this Macedo-Egyptian type of the Metonic correction, than that it is also the date of a third type of the Apis cycle, which came into being on the very same day of the month as this Macedo-Egyptian Metonic calendar; only under the proper Egyptian style of Mesore 30 Nab. 442, not that of Dius 1, or Nov. 2, B.C. 306. And this example proves to us how easily those artful impostors, the priests of Egypt, when they had any purpose to serve by so doing, could alter their oldest, their most solemn, and their most inviolable customs and institutions; could dispense with the most sacred of their rules and observances, even those in which the worship of the Apis himself was concerned. Once before they had changed the type of their Apis cycle; but that had been done sorely against their will, and because they could not help it; but now they must have done it of their own accord. And yet to effect their purpose it would be necessary to put the Apis to death, and to find another, each before its time; for Mesore 30 Nabon. 442 was only the 18th year of the current Apis cycle.

These three types then of the Metonic calendar, each of them wearing externally the form of the Macedonian calendar, and making use of the nomenclature proper to that, having taken their rise in conjunction in B. C. 306; the two former of them in particular are the ultimate sources, the archetypal and primordial lunar originals, of a numerous and extensive family of solar calendars, in the sense of Julian, with which chronologers have long been acquainted under the name of Syro-Macedonian in general; and into the origin of which they have long been employed in searching: though so far as concerns the preliminary discovery and recognition of the proper lunar types of each, or any certain and clear conclusions about the time and the manner of the

transition of each in succession into the Julian, they have searched hitherto with little or no success.

All mystery on these points is cleared up, and all doubt and uncertainty begin to disappear, as soon as the real state of the case is laid open and explained; viz. that the Macedo-Hellenic and the Macedo-Syrian types of the Metonic correction above described respectively are the parents of all these Syro-Macedonian solar and Julian calendars; of all at least which were not derived from the cyclico-Julian modification of the ancient solar year itself: That some of them took their rise out of the Macedo-Hellenic type, others out of the Macedo-Syrian, but all from one or the other of these two: That the process of the transition from the state of the lunar year to that of the solar was the same in all these cases; the substitution of the simple Julian calendar to the preexisting Metonic one, when the state of the latter happened to suit best for such a purpose. That as to the rest, the question was one of time. In some instances this substitution took place earlier, in others later; but in every instance so that advantage might be taken of some convenient circumstance, of some coincidence adapted to the end in view, such as that of the *νουμηνία*, the new year's day, of the old lunar calendar's falling critically on that one Julian term, which it was proposed to constitute the epoch of the new calendar reckoning in the form of solar and in the sense of Julian; a term which, as chronologers have long since seen reason to conclude from the evidence of the fact itself, was one of these three in general, Sept. 24, Oct. 1, and Nov. 1, (though we do actually meet with two *more*, Sept 23 and Oct. 24;) the two former, as we hope to shew hereafter, the proper epochs of the Julian calendars derived from the Macedo-Hellenic lunar type, the latter, Nov. 1, of such as are to be traced up to the Macedo-Syrian.

Much more might be said on these subjects, and much of a very interesting kind:

> Sed fugit interea fugit inreparabile tempus;
> Singula dum capti circumvectamur amore.

Nor is it proper to forestall at present what is more fitly to be reserved for its own time and its own place in a different part of our work.

We shall conclude therefore with submitting to the reader a list of these secondary derivative calendars, analogous to that of the primary which we exhibited supra. And though we call them secondary derivative calendars, yet after what has been said it will be understood that the relation of these also to the primitive is virtually the same as that of the primary themselves.

SECTION IV.—*Synopsis of secondary derivative calendars, or of calendars connected with the primitive through primary derivative calendars; arranged in the order of time.*

Type		Æra Cyclica	Midnight	Æra of Nab.	Midnight	B.C.	Midnight
i	Parthenian Ennead of the Bœotians -	....	....	....	....	1119	Aug. 7
ii	Carnead Ennead of the Spartans -	....	....	....	....	1104	Aug. 18
iii	First correction of the Hindu cal., Metonic	....	....	....	....	946	Oct. 1
iv	Calendar of Romulus - -	3256	Mesore 14	....	....	750	Feb. 4
v	Metonic correction of the Siamese calendar	....	....	....	....	545	Nov. 29
vi	59 years' cycle of Œnopides of Chios -	....	....	....	....	544	June 25
vii	Apis cycle of the Egyptians, type ii -	....	....	225	Epagome. 5	523	Dec. 31
viii	Decemviral correction of the cal. of Numa	....	....	....	....	449	Dec. 29
ix	Metonic correction: Metonic calendar of Elis: Metonic calendar of Ionia -	....	....	....	....	432	July 16
x	Metonic correction of the Spartan cal., type i	....	....	....	....	424	Oct. 11
xi	Metonic correction of the Bœotian calendar	....	....	....	....	407	Jan. 14
xii	Metonic correction of the Rhodian calendar	....	....	....	....	382	May 6
xiii	Metonic correction of the Syracusan calendar, type i - - -	....	....	....	....	382	July 4
xiv	Metonic correction of the cal. of Gela, and of the cal. of Agrigentum - -	....	....	....	....	382	Sep. 1
xv	Metonic correction of the cal. of Argos: Metonic correction of the cal. of Cyrene and of the Pentapolis of Libya, type i -	....	....	....	....	382	Sep. 30
xvi	Metonic correction of the cal. of Cephalædum in Sicily - - -	....	....	....	....	357	June 28
xvii	Cyclico-Persian calendar, or kalendarium vagum of Gjemschid - -	....	....	....	....	342	Mar. 22
xviii	Metonic correction of the cal. of Ætolia -	....	....	....	....	332	Oct. 17
xix	Callippic correction - - -	....	....	....	....	330	June 29
xx	Calendar of Timocharis, or correction of the vulgar Metonic calendar at Athens according to Timocharis - -	....	....	....	....	330	July 1
xxi	Metonic correction of the Macedonian cal.	....	....	....	....	308	Dec. 20
xxii	Macedo-Hellenic correction - -	....	....	....	....	306	Oct. 1
xxiii	Macedo-Syrian correction - -	....	....	....	....	306	Oct. 30
xxiv	Macedo-Egyptian correction - -	....	....	....	....	306	Nov. 2
xxv	Apis cycle of the Egyptians, type iii -	....	....	442	Mesore 30	306	Nov. 2
xxvi	Apis cycle of the Babylonians, type ii -	....	....	442	Epiphi 29	306	Oct. 2
	Macedo-Chaldean correction - -	....	....	....	....	306	Oct. 2
xxvii	Cyclico-Julian correction of Combabus or calendar of Hieropolis in Syria -	3710	Tybi 8	451	Tybi 11	297	Mar. 15
xxviii	Metonic calendar of Sparta, type ii -	....	....	....	....	230	Oct. 30
xxix	Metonic correction of the cal. of Corinth, of the cal. of Sicyon, and of the cal. of the Achæan League - -	....	....	....	....	222	May 7

Type		Æra of Nab.	Midnight	B.C.	Midnight
xxx	Kalendarium Vagum Romanum -	....	....	209	Dec. 29
xxxi	Julian correction of the Roman calendar -	....	....	46	Dec. 30
xxxii	Julian calendar of Nysa in Caria -	....	....	5	Sep. 24
				A. D.	
xxxiii	Julian calendar of Tyre - -	....	....	8	Mar. 18
xxxiv	Julian calendar of Julia in Cyprus -	....	....	22	Sep. 24
xxxv	Julian calendar of Bithynia - -	....	....	71	Dec. 24
xxxvi	Julian calendar of Byblus - -	....	....	99	Sep. 5
xxxvii	Julian calendar of Antioch - -	....	....	101	Nov. 1
xxxviii	Julian cal. of Gaza: Julian cal. of Ascalon	....	....	123	Oct. 28
xxxix	Julian calendar of Athens, type i -	....	....	127	Sep. 4
xl	Julian cal. of Smyrna, Ephesus, Cyzicus -	....	....	157	Sep. 24
xli	Paschal calendar of Montanus - -	....	....	171	Mar. 24
xlii	Julian calendar of Pergamus - -	....	....	177	Sep. 24
xliii	Julian calendar of Stratonicea in Caria -	....	....	198	Oct. 1
xliv	Modern Julian cal., Modern Gregorian cal.	....	....	225	Jan. 1
xlv	Paschal cycle of the ancient British church	....	....	268	Dec. 25
xlvi	Restoration of the Gjemschid rule of the Persian calendar - - -	1019	Paüni 6 ..	272	Mar. 18
xlvii	Julian calendar κατὰ Μακεδόνας, type i -	....	....	....	Sep. 24
	type ii -	....	....	....	Sep. 23
xlviii	Julian calendar κατὰ Ἕλληνας, type i -	....	....	....	Oct. 1
	type ii -	....	....	....	Oct. 24
xlix	Julian calendar κατὰ Σύρους - -	....	....	....	Nov. 1
l	Julian calendar of Arabia - -	....	....	....	Mar. 22
li	Julian calendar of Bostra - -	....	....	....	Mar. 22
lii	Julian calendar of Damascus - -	....	....	....	Mar. 27
liii	Julian calendar of Sidon - -	....	....	....	Mar. 31
liv	Julian calendar of Seleucia on the Tigris -	....	....	....	Aug. 7
lv	Julian calendar of Heliopolis or Balbec -	....	....	....	Aug. 24
lvi	Julian calendar of Lycia - -	....	....	....	Sep. 4
lvii	Julian calendar of Crete - -	....	....	....	Sep. 23
lviii	Julian calendar of Salamis or Constantia in Cyprus - - -	....	....	339	Sep. 5
lix	Paschal Ducenarium of Andrew of Byzantium or Apis cycle of the Armenians -	1100	Navasardi 9	352	Sep. 9
lx	Julian calendar of Armenia - -	1183	Navasardi 1	435	Aug. 12
lxi	Modern Julian calendar of Syria -	....	....	473	Oct. 1
lxii	Seventh and last correction of the Hindu calendar - - -	....	....	538	Mar. 22
lxiii	Proleptic calendar of Hej'ra - -	....	....	622	July 16
lxiv	Kalendarium Vagum Lunare of Islamism -	....	....	630	July 16
lxv	Julian correction of Yezdejerd - -	....	....	632	Mar. 18
lxvi	Julian calendar of Cappadocia - -	....	....	1024	Dec. 12
lxvii	Gelalæan correction - -	....	....	1079	Mar. 15
lxviii	Calendar of Azarias or calendar of the Armenians of Joulfa - -	....	....	1081	Mar. 14
lxix	Aztec correction of the Toltec calendar, or Mexican calendar, type i - -	1864	Phaophi 15	1116	Jan. 1
	Mexican calendar, type ii - -	....	....	1142	Dec. 31
lxx	Tezcuchan correction of the Toltec calendar	....	....	....	Dec. 31
lxxi	Teotuachan correction of the Toltec cal. -	....	....	....	Dec. 28
lxxii	Metonic calendar of Abyssinia -	....	....	1441	Sep. 16
lxxiii	Metonic calendar of Peru - -	....	....	1444	Dec. 11

DISSERTATION VIII.

Fasti Cyclici.

CHAPTER I.

On the constitution of the primitive civil year, and on its principal peculiarities.

SECTION I.—*The existence of the primitive civil year not altogether unknown to chronologers.*

THE existence of this primitive civil year, of which we are giving an account, in some instance or other, and in one quarter of the world or another, has never been unknown to chronologers. Too many vestiges of it were still to be discovered, and too many allusions to it were to be met with in ancient authors, to leave any doubt of its actual existence among some or other of the nations of old. The truth, which has hitherto been overlooked, (and without exception, so far as we know to the contrary,) is the *universality* of this form of the civil year from the first; that none else but this once existed among mankind; and that all forms of the civil year which have actually existed, and any where, distinct from this, have been only derivative or secondary forms of this.

Petavius has an observation which shews that he had conceived a correct idea of the nature of the antediluvian year; and therefore of this primitive year itself. But he proposes it only as a conjecture; and he casts doubts on the certainty of his own conjecture. Referring to his Doctrina Temporum[a] for the more complete explanation of the grounds of his opinion, he remarks in his Variæ[b]: Ostensum est illic de anni quidem forma quæ per id tempus usurpata fuerit affirmare certo posse neminem; probabile tamen videri annum ab iis æquabilem dierum circiter CCCLXV cum tricenariis mensibus adhibitum fuisse: sic ut appendices dies aut

a Lib. ix. cap. ix. b Lib. v. cap. ii. 192. C. Uranologium.

reservarentur in anni cujuslibet finem, aut annis aliquot elapsis intercalarentur. The reader has been made aware that of these two suppositions the former alone at first was the truth; the latter was characteristic of that modification of the primitive equable year to which we have given the name of cyclico-Julian.

SECTION II.—*On the proper mode of designating or denominating the primitive civil year.*

It is usual with chronologers to call this primitive form of the civil year wheresoever they have found it in being the *annus vagus*; the wandering, erratic, or moveable year. It must be admitted that, as referred to any standard of annual time greater than itself, as for example the mean Julian, it appears to fall back regularly upon it; to deviate more and more from it the longer it is compared with it; and to deviate in defect. It is also true that, as referred to the mean natural year, which is both invariable in itself and greater than this, it recedes in like manner on that too; and the more so the longer it goes on in conjunction with it: so that it is and must be one of the most obvious characteristics of this primitive form of the civil year, referred perpetually to the natural, to fall back through all the seasons of the natural year, to circulate about any fixed term in the natural year like the vernal equinox; and, after it has once coincided with it, not to be able to do so again, until it has described the whole round of natural annual time, and has coincided with every term in the natural year, and in every season, besides.

In this sense it must be called erratic or wandering: erratic among the seasons of the natural year, a wanderer in and among the months and the days of the natural year. But there is still a limit to its vagueness even in this respect. For as it is always the same in itself, if it is always referred to that which is perpetually the same too, the mean natural year, its proportion to the latter being fixed and invariable, it must return to the same state of relation to it at the end of the same interval of time, determined by that proportion. There is a period of restitution of this year to the mean natural year, dependent on the proportion of one to

the other: and consequently, while that proportion continues the same, this period founded upon it remains the same too.

Chronologers have long been aware of such a period of restitution of the vague year, as they denominate it, and of the mean or the actual Julian year. They deduce this period too from the relation of one of these years to the other; and, as so determined, they have given it the name of the Sothiacal period; understanding thereby 1461 years of the vague, and 1460 of the mean or the actual Julian: names and distinctions which if new to any of our readers will be explained and cleared up as we proceed. This Sothiacal period is as true of the mean natural year, (supposed to be constantly the same as the mean Julian,) and of the *annus vagus*, as of the mean Julian year itself. But as to the mean natural year *per se*, according to the standard thereof assumed in our Fasti; the period which brings back a given term in the moveable year to the same state of relation to a given term in the natural, as we shall see hereafter, is considerably greater than 1460 mean natural years; and in fact is not less than 1508, though not so great as 1509.

Chronologers however speak of this primitive year under the name of the *annus æquabilis* also; a very different designation from that of the *annus vagus*, yet one which does much more truly belong to it, and much more correctly describe it as what it is in itself, and as referred to nothing but itself, or to nothing but what is as fixed and invariable as itself, the cycle of night and day. That which does really distinguish this particular form of the civil year is its uniformity, its constancy, its equability. We have often had occasion to observe that it is the proper measure of natural annual time in noctidiurnal. It is the nearest approach to the actual length of the mean natural year, in entire cycles of night and day, which is possible; so that while the cycle of night and day continues what it is, and the mean natural year continues what it is, every natural year, in terms of the cycle of night and day, must be reckoned in a civil year of this kind, and of this kind only: for there can never be either more or less than 365 cycles of night and day complete in one and the same mean natural year perpetually.

Accordingly such is the real state of the case which has held good of this primitive type of civil annual time from

the first. It has never consisted of either more or fewer than 365 integral cycles of night and day; 365 returns of the same meridian to the mean sun; 365 periods of 24 hours of mean solar time. It never contained either more or less than that number of actual cycles or periods of this kind, even when, because of the extraordinary circumstances of the case, one actual cycle or period of this kind came to be equal to two of mean.

It is evident therefore that the name of the equable year is more justly its due than that of the vague or inconstant. It is evident also, as we have already more than once observed, that it is more properly to be considered a cycle or complex of noctidiurnal time than of annual; and the same thing in general as the hebdomadal, only larger and more comprehensive. Neither this cycle of 365 days, nor the hebdomadal cycle of 7 days, is a proper measure of the mean natural year; but they are both exact measures of the cycle of night and day. Mean natural annual time could be kept and reckoned in either perpetually only very imperfectly: noctidiurnal with the most absolute truth and exactness for ever.

The general idea then of this primitive civil year is that of a larger form of the noctidiurnal succession; always the same with itself. It cannot, except *per accidens* and only in a given instance at a time, be reducible under that of the annual. In strictness therefore it is scarcely proper to call it a year. In conformity however to the *modus loquendi*, we may still allude to it, as we have hitherto done, as to one among the other recognised forms and varieties of the solar year. It would answer no useful purpose to affect any novelty on this point; or to attempt to correct the merely conventional language of technical chronology. It is sufficient to have pointed out the real distinctions which exist in things, by whatsoever names they may be called; and these being once understood, we may use what terms we please in speaking of them.

SECTION III.—*Division of the primitive civil year.*

Now this simple and uniform complex of noctidiurnal time, (to which we are thus agreeing to give the name of a

year in general, but that of the equable solar year in particular,) consisting of 365 actual nights and days perpetually, appears to have been every-where divided at first into twelve months of 30 days each, containing collectively 360 days; and into a thirteenth month, if it may be so called, containing the remaining five. These five days, in the idiomatic language and style of chronologers, are commonly called the appendices of the equable year. The term epact has become restricted to the difference of the solar and the lunar year; or these five days might be styled the epact of the equable year: and as it is, by the Greek chronologers of antiquity they are always denominated the ἐπαγόμεναι (ἡμέραι) of this year; the literal meaning of this term in Greek being "superinduced," or "superinductive;" days which must still be added and taken into account, must still be superinduced, to complete the year, even when the reckoning of the year itself might seem to have come to an end.

This division of the primitive civil year into 12 months of 30 days each appears to have been every where that which was first in use. This year therefore, as every where measured or measurable by complete months, contained every where only 360 days; and it is a consequence of that fact that allusions to this primitive form of the civil year are sometimes met with in antiquity, from which it might be concluded at first sight that it consisted of 360 days and no more. Nothing in reality was more common than in general statements of the length of the year to leave these five days at the end entirely out of sight. They entered into none of the months, not even the last; and therefore they could not be included in the reckoning of the months. They could not indeed be omitted in the reckoning of the year, nor in that of night and day as it entered perpetually into the year; but they might be omitted, or rather they must be, from the cycle or complex of the months: and men having once been accustomed to regard them as making no part of the months, they would soon come, from the force of habit and when they were speaking only in general terms, to leave them out of sight as part of the year.

This is the true explanation of many testimonies of antiquity, from which learned men have been induced to infer

that there must have been a primitive form of the civil year, in some instance or other, restricted to 360 days; though, as far as our own observation goes, this is that form of the civil reckoning of annual time which least of all appears to have had an existence any where, at least in the shape of a solar year. The lunar year of the Greeks from the time of Solon downwards nominally consisted of 360 days, even when in reality it never consisted of more than 354 in his calendar, or of more than 353 or 355 in that of Meton. And as the Greek writers later than Solon continually speak of this year as if it was one of 360 days, so do many of the ancients speak of the primitive solar year as if it was one of 360 days also: six days from the force of habit being nominally given to the lunar year in the former case, more than it really contained, and five days to the solar in the latter, less than really belonged to it.

In the course of time indeed, and as an accompaniment of changes in the form and constitution of the primitive year itself, these twelve months were subjected to other divisions, of which there is no necessity to give a particular account at present. Such details belong to the history of particular derivative calendars. The Apis cycle required a new and a distinct reckoning of the months. The Nundinal correction appears to have entailed various changes of this kind. The Hindu or Indian calendar has long had months of 15 days. The Toltec or Aztec correction was characterized by the subdivision of the calendar into 18 months of 20 days each. To variations of this kind no limit can be assigned. They might be expected *a priori;* and they are found to prevail, agreeably to the expectation.

It was another characteristic of these five days at the end of the year, not only to be seldom if ever formally taken into the account of the year, but scarcely even into that of the business and details of public or private life. In most of the calendars of antiquity they were either devoted to pastime and amusement, as not worthy of any more serious use, or regarded in a superstitious light; i. e. suspected and shunned as days of an ominous and forbidding aspect. The nations of the old world appear to have viewed and to have

treated them as holidays, such as we describe: those of the new world, (some of the communities of Spanish America at least, as we shall see hereafter,) as prohibited days, on which nothing good was to be expected, nothing serious was to be attempted, much less any thing like pleasure or pastime was to be attended to. In either case, they were alike set aside from the ordinary applications and uses of noctidiurnal time; though from a very different opinion about their own nature in each of these cases respectively.

It is not surprising then that, as these five days made no part of any of the months, so even when the months of the calendar received proper names these five were left without names notwithstanding. In the Egyptian calendar we can discover no name by which they were called. The Greeks mention every month in that calendar under its proper Egyptian name, and they mention these five days too; but always by the Greek name of *αἱ ἐπαγόμεναι.* In the modern Egyptian calendar, i. e. the Coptic, they have the name of Nesi; borrowed however from the Arabs, and merely denoting intercalary, or days introduced to make out the year. In the Coptic idiom itself they are styled merely, in the complex, *mensis parvus.* The Abyssinian calendar gives them the name of Pagomen; which is only a corruption of the Greek Epagomenæ. The Armenian terms them Aceliucz; the Persian Musteraka, borrowed from the Arabs, or Pengja Duzdîda, meaning the same thing; the furtive five, or five days of stealth. The Toltec or Aztec styled them Nemontemi; which was an appellative term too, in their language, denoting merely the estimation in which these days were held, (as "The five *unfortunate* days,") above all the rest in the calendar besides.

Homer, in one or two passages, which, if God permits, we hope to lay before our readers on some future occasion, speaks of them as *days,* in contradistinction to months; shewing that neither among the Greeks in his time had they yet been attached to any month or formed into a month by themselves. And yet a remarkable fact holds good of these five days among the Greeks, the like to which we have not been able to discover in any other instance; viz. that from the time of the institution of the Olympic games by

Pelops these Epagomenæ of the primitive Hellenic calendar constituted a month *sui generis,* and a month which had a name; while the rest of the months as yet had none.

It has been already stated that the Olympic calendar of Pelops was Julian. The Julian year has its epagomenæ; which in the common years amount to five days, in the leap years to six. The leap years of the Julian cycle of Pelops were the years of the games; and the feriæ of the games were purposely attached to the six epagomenæ of such years. And the Olympic games having been dedicated from the first to Kronos, the type of time, and the original personification of the sun, among the Greeks; and the games themselves, from that circumstance, having received the name of Kronia; the six days to which they were attached, for the same reason, either by the original constitution of Pelops, or in the course of time and from the use to which they were put, received the name of the μὴν Κρόνιος, the Kronian month, or month of the Kronia. We may collect this fact from the testimony of Plutarch; who tells us, in his life of Theseus, that Hecatombæon once bore the name of Kronius. In the calendar of Solon Hecatombæon coincided with the same season of the tropical year as this Kronian month of Pelops; and that was all the coincidence which there could be in the nature of things between a perfect month of 29 days and an imperfect one of six days. The proper Kronia of the Attic ritual also, either from the time of Solon, or from that of the Metonic correction, certainly fell out in this month Hecatombæon; as we hope to shew hereafter.

CHAPTER II.

SECTION I.—*Succession of the cycle of night and day in the equable cyclical year, compared with the same thing in the Julian types of the Fasti.*

The succession of night and day being supposed to have begun at the same moment in the mean natural year, in the Julian type of that year assumed in these Fasti, and in the equable year explained as above, it is manifest that for a

certain length of time it must go on alike in each; that for the first *three* years of each kind the noctidiurnal cycle must proceed alike in each and preserve the same relation to each: but that at the end of the *fourth* year, which is *leap* year in the Julian cycle of annual time, and (on the principles of our Fasti) in the natural also, the first cycle of night and day in the *fifth* equable year will be found to be anticipating 24 hours of mean time, (i. e. one entire cycle,) on the first in the fifth Julian or in the fifth natural. And the anticipation of the noctidiurnal succession in equable annual time on that in actual Julian, or in mean natural annual time, so begun, so generated, so measured, will be found to go on and to accumulate at the same rate, as long as the equable year itself and these other two go on in conjunction.

It is superfluous indeed to remind our readers of so obvious and probably so well known a truth as *this;* that a year of 365 nights and days only must lose a night and a day in the course of every four years on one of 365 days and a quarter; or what amounts to the same thing, on a year of 365 nights and days every three years and of 366 every fourth. We have said enough however to prove that a Julian type of annual time, which is destined to serve as the perpetual antitype of natural annual before the existence of the actual Julian year, must be corrected from time to time, or to speak more properly must be changed; that one and the same type of mean natural annual time, (an invariable idea in itself,) before the actual existence of that one type of Julian which represents it at present, can be expressed only by a succession of Julian types, one substituted for another in subserviency to the same end and purpose, as often as the true relation of type and antitype in a case of this kind is in danger of being disturbed beyond certain limits, by excess on the part of the Julian antitype, and by defect on that of the natural type which determines the idea of the Julian.

In this case the effect is the same as if at stated times we dispensed with the cycle of leap year, and thereby with a night and a day, using the same Julian type in other respects notwithstanding; or (to speak more correctly[a]) not because

[a] See the Introduction to the Tables, part ii. chap. iv. sect. 3.

we ever dispensed with the cycle of leap year, or with the leap day, in the Julian type which we actually use; but because with every fresh type of the kind we reckoned this cycle from a fresh radix or epoch. In either case, in the constant comparison of the noctidiurnal succession in equable annual time with the same thing in Julian as thus the perpetual representative of natural, the result is the same; viz. that for seven years (i. e. from the fourth year before the end of a former type to the fourth year after the beginning of the next) there is no apparent difference between equable annual time and actual Julian. Both consist or seem to consist for seven years in succession of 365 days only. In such cases therefore the equable year seems to stand still in terms of the Julian seven years instead of four; contrary to its usage at all other times.

There is no change indeed, even under these circumstances, in the equable year; nor in the noctidiurnal succession in that year. It exhibits no new phenomenon even in these cases. It consists of neither more or less than 365 nights and days, for each of these seven years as much as for any other. It is not in short the equable year which is standing still under such circumstances, but the Julian: nor even the Julian, according to the principles of our assumptions, except in appearance. A new type of Julian annual time as the representative of natural is entering our tables at these junctures, which in comparison of that which is leaving them seems to want a day: though in reality it wants nothing, even at such conjunctures, as the proper representative of true annual time in terms of Julian. The reckoning of noctidiurnal time then in terms of annual Julian under such circumstances assumes *pro tempore* the law of the same thing in equable annual. While this lasts the two forms of noctidiurnal and of annual time cannot differ in appearance from each other. But the noctidiurnal succession in particular is still going on according to its proper law in each; in the equable without the appearance of any phenomenon different from usual; in the Julian even at such times according to the proper law of such a succession in annual Julian of its own type; and that a law always the same in principle, and always Julian in its application.

Now to the equable year, as thus supposed to have set out in conjunction with the mean natural and with the Julian type of the mean natural, and to have accompanied both ever after, receding upon them at a certain rate, i. e. one day in four years, as a general rule, and one in seven years at stated times, as an exception to that general rule; we give the name of the *cyclical* or revolving year: though we have already declared it to be our opinion that it is much more properly to be called the equable year; and therefore it will be understood that we give it this name of cyclical or revolving only as constantly referrible either to the actual standard of mean annual time assumed in these Fasti, or to the artificial type of that standard assumed in them also.

Section II.— *Succession of the cycle of night and day in the Nabonassarian type of the equable year; or in the equable year perpetually referred to the simple Julian.*

The idea of the Julian year, such as it exists at present in all respects yet supposed to be carried back to any distance of time from the present day, has long been familiar to chronologers; and indeed when they speak of the Julian year at all *proleptically,* that is before its actual time, they never mean any thing else but this. It is just as possible to conceive an idea of the equable year, which shall always make it appear one and the same thing in reference to the simple Julian, and therefore make it always preserve the same relation to the simple Julian; always recede on the simple Julian at the same rate in the same length of time.

And in fact chronologers have long been acquainted with this conception of the equable year also. It is that idea of this year and of its proper relation to the simple Julian, which every chronologer would recognise at once under the name of the year of Nabonassar. For the chronological year of Nabonassar is neither more or less than the simple equable year of 365 days, constantly referred to the simple Julian as its standard, and constantly equated to it; and therefore supposed to recede *one* day every four Julian years, or for every cycle of leap year, in this simple Julian year.

This equable chronological year had an actual historical

beginning; which is commonly assumed to have been Feb. 26 at midnight, B. C. 747. But as the law of the equable year under all circumstances is known, and the law of the simple Julian year is also known; both being supposed to be invariable, there is no difficulty nor uncertainty in tracing them back in conjunction to any distance of time, even to the beginning of mundane time itself: and if it may be assumed that the proper epoch of the equable Nabonassarian reckoning of annual time in terms of Julian, at the historical date of the æra of Nabonassar, B.C. 747, was Feb. 26 at midnight, it may be assumed, as only consistent with that hypothesis, that the corresponding epoch of the former in terms of the latter, B. C. 4004, must have been May 21 at midnight.

We are at liberty then if we please to suppose the simultaneous existence of two types of the equable reckoning of annual time at the very beginning of mundane time itself; one of them the cyclical described as above, referrible perpetually to the Julian types of our Fasti, the other the Nabonassarian, referrible in like manner continually to one and the same Julian type, (and that the simple Julian of the present day carried back to the beginning of things,) on which the equable year must recede after a fixed rate perpetually. Each of these however having come into being A. M. 1, B. C. 4004, the former on April 25 at midnight, the latter on May 21 at midnight; it is manifest that each would set out along with its proper Julian standard of reference, and in obedience to its proper law as the subject of that reference perpetually, 26 nights and days distant from the other; and that the succession of equable noctidiurnal time in equable annual in the cyclical type of each would differ from the same thing in the Nabonassarian by 26 days even from the first.

SECTION III.—*Calendar of the equable solar year of primitive antiquity, under the Egyptian names of the months.*

In the further prosecution of this part of our subject, we shall have frequent occasion to refer to the calendar of the primitive year; and to the reckoning of both these types of equable annual time in their respective months. We shall here therefore propose the scheme of this calendar: borrowing for

that purpose the names of the months in the Egyptian type of the primitive year, because they are the oldest on record discoverable any where at present; and substituting them for those of this calendar itself, which, as we have already observed, were discriminated asunder at first only by their numerical order.

Scheme of the primitive civil calendar under the Egyptian names of the months; adapted alike both to the cyclical type of equable annual time and to the Nabonassarian.

Months.	Names.	Length.	Months.	Names.	Length.
i.	Thoth	30 days.	vii.	Phamenoth	30 days.
ii.	Phaophi	30	viii.	Pharmuthi	30
iii.	Athyr	30	ix.	Pachon	30
iv.	Chœac	30	x.	Paüni	30
v.	Tybi	30	xi.	Epiphi	30
vi.	Mecheir	30	xii.	Mesore	30
			xiii.	Epagomenæ / Appendices	5 days.

SECTION IV.—*Synopsis of the Noctidiurnal succession in the cyclical and in the Nabonassarian type of the equable year.*

The next thing to be done, in order to prepare the way for those further explanations which we have yet to propose on these subjects, is to exhibit the same summary and comprehensive survey of the decursus of the same fixed and invariable natural term, the mean natural or mean Julian equinox, in equable noctidiurnal, hebdomadal, and annual time both cyclical and Nabonassarian, which we have already exhibited in the mean natural year, and in the Julian year of our Fasti compared with the natural perpetually. This survey too will be divided into two parts, as the former was: the first, from A. M. 1, B. C. 4004, Æra cyc. 1, to A.M. 4229, A. D. 225, Æra cyc. 4232: the second from A. M. 4229, A. D. 225, Æra cyc. 4232, to the end of our tables.

Synopsis of the Noctidiurnal cycle in the natural year, in the Julian year of the Fasti, in the cyclical year, and in the Nabonassarian year, from the point of the mean vernal equinox to the point of the mean vernal equinox, through the Julian periods of the Fasti: also of the cyclical first of Thoth in terms of the year of Nabonassar, and of the Nabonassarian tenth of Mesore in terms of the cyclical year, at the beginning of each of the same periods.

	A			B		BB				C			CC			D	DD	DDD		E	EE	EEE		F
Period	Yrs.	A. M.	B. C.	Mid-night	Feria	Mid-night	Feria	D. L.	Æra cycl.	Midnight	Feria	G	Midnight	Feria	GG	Midnight	Midnight	Mid-night	Feria	Midnight	Midnight	Mid-night	Feria	
i	112	1	4004	Apr. 24	7 6	Apr. 25	1 7	C	1	Thoth 1	1 7	0	Mesore 10	1 7	0	Thoth 1	Mesore 10	Apr. 25	1	Mesore 10	Thoth 1	Apr. 25	1	26
ii	140	113	3892	Apr. 23	5 4	Apr. 24	6 5	D	113	Thoth 27	6 5	26	Thoth 2	6 5	27	Thoth 1	Mesore 11	Mar. 29	1	Mesore 10	Epag. 5	Mar. 28	7	25
iii	112	253	3752	Apr. 22	3 2	Apr. 23	4 3	E	253	Phaophi 30	4 3	33	Phaophi 6	4 3	34	Thoth 1	Mesore 12	Feb. 23	1	Mesore 10	Epag. 4	Feb. 21	6	24
iv	140	365	3640	Apr. 21	1 7	Apr. 22	2 1	F	365	Athyr 26	2 1	26	Athyr 3	2 1	27	Thoth 1	Mesore 13	Jan. 27	1	Mesore 10	Epag. 3	Jan. 24	5	23
v	112	505	3500	Apr. 20	6 5	Apr. 21	7 6	G	506	Chœac 29	7 6	33	Chœac 7	7 6	34	Thoth 1	Mesore 14	Dec 24	2	Mesore 10	Epag. 2	Dec. 20	5	22
vi	140	617	3388	Apr. 19	4 3	Apr. 20	5 4	A	618	Tybi 25	5 4	26	Tybi 4	5 4	27	Thoth 1	Mesore 15	Nov. 27	2	Mesore 10	Epag. 1	Nov. 22	4	21
vii	140	757	3248	Apr. 18	2 1	Apr. 19	3 2	B	758	Mecheir 28	3 2	33	Mecheir 8	3 2	34	Thoth 1	Mesore 16	Oct. 24	2	Mesore 10	Mesore 30	Oct. 18	3	20
viii	112	897	3108	Apr. 17	7 6	Apr. 18	1 7	C	898	Pharmuthi 1	1 7	33	Phamenoth 12	1 7	34	Thoth 1	Mesore 17	Sep. 20	2	Mesore 10	Mesore 29	Sep. 13	2	19
ix	140	1009	2996	Apr. 16	5 4	Apr. 17	6 5	D	1010	Pharmuthi 27	6 5	26	Pharmuthi 9	6 5	27	Thoth 1	Mesore 18	Aug. 24	2	Mesore 10	Mesore 28	Aug. 16	1	18
x	112	1149	2856	Apr. 15	3 2	Apr. 16	4 3	E	1150	Pachon 30	4 3	33	Pachon 13	4 3	34	Thoth 1	Mesore 19	July 21	2	Mesore 10	Mesore 27	July 2	7	17
xi	140	1261	2744	Apr. 14	1 7	Apr. 15	2 1	F	1262	Paüni 26	2 1	26	Paüni 10	2 1	27	Thoth 1	Mesore 20	June 24	2	Mesore 10	Mesore 26	June 14	6	16
xii	140	1401	2604	Apr. 13	6 5	Apr. 14	7 6	G	1402	Epiphi 29	7 6	33	Epiphi 14	7 6	34	Thoth 1	Mesore 21	May 21	2	Mesore 10	Mesore 25	May 10	5	15
xiii	112	1541	2464	Apr. 12	4 3	Apr. 13	5 4	A	1542	Epagomene 2	5 4	33	Mesore 18	5 4	34	Thoth 1	Mesore 22	Apr. 17	2	Mesore 10	Mesore 24	Apr. 5	4	14
xiv	140	1653	2352	Apr. 11	2 1	Apr. 12	3 2	B	1654	Thoth 23	3 2	26	Thoth 10	3 2	27	Thoth 1	Mesore 23	Mar. 21	2	Mesore 10	Mesore 23	Mar. 8	3	13

Synopsis of the Noctidiurnal cycle, &c.

	A			B		BB				C			CC			D	DD	DDD		E	EE	EEE		F
Period	Yrs.	A.M.	B. C.	Mid-night	Feria	Mid-night	Feria	D.L.	Æra cycl.	Midnight	Feria	G	Midnight	Feria	GG	Midnight	Midnight	Mid-night	Feria	Midnight	Midnight	Mid-night	Feria	
xv	112	1793	2212	Apr. 10	7 6	Apr. 11	1 7	C	1794	Phaophi 26	1 7	33	Phaophi 14	1 7	34	Thoth 1	Mesore 24	Feb. 15	2	Mesore 10	Mesore 22	Feb. 1	2	12
xvi	140	1905	2100	Apr. 9	5 4	Apr. 10	6 5	D	1906	Athyr 22	6 5	26	Athyr 11	6 5	27	Thoth 1	Mesore 25	Jan. 19	2	Mesore 10	Mesore 21	Jan. 4	1	11
xvii	140	2045	1960	Apr. 8	3 2	Apr. 9	4 3	E	2047	Chœac 25	4 3	33	Chœac 15	4 3	34	Thoth 1	Mesore 26	Dec. 16	3	Mesore 10	Mesore 20	Nov. 30	1	10
xviii	112	2185	1820	Apr. 7	1 7	Apr. 8	2 1	F	2187	Tybi 28	2 1	33	Tybi 19	2 1	34	Thoth 1	Mesore 27	Nov. 12	3	Mesore 10	Mesore 19	Oct. 16	7	9
xix	140	2297	1708	Apr. 6	6 5	Apr. 7	7 6	G	2299	Mecheir 24	7 6	26	Mecheir 16	7 6	27	Thoth 1	Mesore 28	Oct. 16	3	Mesore 10	Mesore 18	Sep. 18	6	8
xx	56	2437	1568	Apr. 5	4 3	Apr. 6	5 4	A	2439	Phamenoth 27	5 4	33	Phamenoth 20	5 4	34	Thoth 1	Mesore 29	Sep. 12	3	Mesore 10	Mesore 17	Aug. 14	5	7
xxi	140	2493	1512	Apr. 4	2 1	Apr. 5	3 2	B	2495	Pharmuthi 9	3 2	12	Pharmuthi 3	3 2	13	Thoth 1	Mesore 30	Aug. 30	3	Mesore 10	Mesore 16	Aug. 10	4	6
xxii	112	2633	1372	Apr. 3	7 6	Apr. 4	1 7	C	2635	Pachon 12	1 7	33	Pachon 7	1 7	34	Thoth 1	Epag. 1	July 27	3	Mesore 10	Mesore 15	July 6	3	5
xxiii	140	2745	1260	Apr. 2	5 4	Apr. 3	6 5	D	2747	Paüni 8	6 5	26	Paüni 4	6 5	27	Thoth 1	Epag. 2	June 30	3	Mesore 10	Mesore 14	June 8	2	4
xxiv	140	2885	1120	Apr. 1	3 2	Apr. 2	4 3	E	2887	Epiphi 11	4 3	33	Epiphi 8	4 3	34	Thoth 1	Epag. 3	May 27	3	Mesore 10	Mesore 13	May 4	1	3
xxv	112	3025	980	Mar. 31	1 7	Apr. 1	2 1	F	3027	Mesore 14	2 1	33	Mesore 12	2 1	34	Thoth 1	Epag. 4	Apr. 23	3	Mesore 10	Mesore 12	Mar. 30	7	2
xxvi	140	3137	868	Mar. 30	6 5	Mar. 31	7 6	G	3139	Thoth 5	7 6	26	Thoth 4	7 6	27	Thoth 1	Epag. 5	Mar. 27	3	Mesore 10	Mesore 11	Mar. 2	6	1
xxvii	56	3277	728	Mar. 29	4 3 2	Mar. 30	5 4 3	A	3279	Phaophi 8	5 4 3	33	Phaophi 8	5 4 3	34	Thoth 1	Thoth 1	Feb. 21	3	Mesore 10 + 26 Thoth 1	Mesore 10 + 26 Thoth 1	Jan. 26 + 26 Feb. 21	5 26 3	0
xxviii	140	3333	672	Mar. 27	1 7	Mar. 28	2 1	B	3335	Phaophi 19	2 1	11	Phaophi 20	2 1	12	Thoth 1	Thoth 2	Feb. 8	3	Mesore 10	Mesore 9	Jan. 12	4	1

Synopsis of the Noctidiurnal cycle in the natural year, in the Julian year of the Fasti, in the cyclical year, and in the Nabonassarian year, from the point of the mean vernal equinox to the point of the mean vernal equinox, through the Julian periods of the Fasti; and of the cyclical first of Thoth in terms of the Nabonassarian year, and of the Nabonassarian ninth of Mesore in terms of the cyclical year, at the beginning of each of the same periods.

	A			B		BB					C			CC			D	DD	DDD		E	EE	EEE		F
Period	Yrs.	A.M.	B. C.	Mid-night	Feria	Mid-night	Feria	D.L.	Æra Cyclica	Æra of Nab.	Midnight	Feria	G	Midnight	Feria	GG	Midnight	Midnight	Mid-night	Feria	Midnight	Midnight	Mid-night	Feria	
xxviii	140	3333	672	Mar.27	1 7	Mar.28	2 1	B	3335	76	Phaophi 19	2 1	11	Phaophi 20	2 1	12	Thoth 1	Thoth 2	Feb. 8	3	Mesore 9	Mesore 8	Jan. 11	3	1
xxix	112	3473	532	Mar.26	6 5	Mar.27	7 6	C	3475	216	Athyr 22	7 6	33	Athyr 24	7 6	34	Thoth 1	Thoth 3	Jan. 5	3	Mesore 9	Mesore 7	Dec. 7	3	2
xxx	140	3585	420	Mar.25	4 3	Mar.26	5 4	D	3588	329	Chœac 18	5 4	26	Chœac 21	5 4	27	Thoth 1	Thoth 4	Dec. 9	4	Mesore 9	Mesore 6	Nov. 9	2	3
xxxi	140	3725	280	Mar.24	2 1	Mar.25	3 2	E	3728	469	Tybi 21	3 2	33	Tybi 25	3 2	34	Thoth 1	Thoth 5	Nov. 5	4	Mesore 9	Mesore 5	Oct. 5	1	4
xxxii	112	3865	140	Mar.23	7 6	Mar.24	1 7	F	3868	609	Mecheir 24	1 7	33	Mecheir 29	1 7	34	Thoth 1	Thoth 6	Oct. 2	4	Mesore 9	Mesore 4	Aug.31	7	5
xxxiii	140	3977	28	Mar.22	5 4	Mar.23	6 5	G	3980	721	Phamenoth 20	6 5	26	Phamenoth 26	6 5	27	Thoth 1	Thoth 7	Sep. 5	4	Mesore 9	Mesore 3	Aug. 3	6	6
			A. D.																						
xxxiv	112	4117	113	Mar.21	3 2	Mar.22	4 3	A	4120	861	Pharmuthi 23	4 3	33	Pharmuthi 30	4 3	34	Thoth 1	Thoth 8	Aug. 2	4	Mesore 9	Mesore 2	June29	5	7
xxxv	140	4229	225	Mar.20	1 7	Mar.21	2 1	B	4232	973	Pachon 19	2	26	Pachon 27	2	27	Thoth 1 −8 Mesore28	Thoth 9 −8 Thoth 1	July 6 −8 June28	4 −8 3	Mesore 9 +27 Thoth 1	Mesore 1 +27 Mesore28	June 1 +27 June28	4 27 3	8

Synopsis of the Noctidiurnal cycle in the natural year, in the Gregorian of the Fasti, in the Julian, in the cyclical, and in the Nabonassarian, from the point of the mean vernal equinox to the point of the mean vernal equinox, through the Julian periods of the Fasti from A. D. 225 *downwards; and of the cyclical or Gregorian first of Thoth in terms of the year of Nabonassar, and of the Nabonassarian or Julian ninth of Mesore in terms of the cyclical year, at the beginning of each period from* A. D. 225 *downwards.*

	A			B				BB				C			CC			D	DD		E	EE		F
Period	Years	A. M.	A. D.	Midnight	Feria	D. L.	Æra Cyclica	Midnight	Feria	G	Æra of Nab.	Midnight	Feria	D.L.	Midnight	Feria	GG	Midnight	Midnight	Feria	Midnight	Midnight	Feria	
xxxv	140	4229	225	Mar.21	2	B	4232	Pachon 19	2		973	Mar.21	2	B	Pachon 27	2		Thoth 1	Thoth 9	4	Mesore 9	Mesore 1	4	8
xxxvi	140	4369	365	Mar.21	1	C	4372	Paüni 23	1	34	1113	Mar.20	1	B	Epiphi 1	1	34	Thoth 1	Thoth 9	4	Mesore 9	Mesore 1	4	9
xxxvii	112	4509	505	Mar.21	7	D	4512	Epiphi 27	7	34	1253	Mar.19	7	B	Mesore 5	7	34	Thoth 1	Thoth 9	4	Mesore 9	Mesore 1	4	10
xxxviii	140	4621	617	Mar.21	6	E	4624	Mesore 24	6	27	1365	Mar.18	6	B	Epagomene 2	6	27	Thoth 1	Thoth 9	4	Mesore 9	Mesore 1	4	11
xxxix	112	4761	757	Mar.21	5	F	4764	Thoth 23	5	34	1505	Mar.17	5	B	Phaophi 1	5	34	Thoth 1	Thoth 9	4	Mesore 9	Mesore 1	4	12
xl	140	4873	869	Mar.21	4	G	4876	Phaophi 20	4	27	1617	Mar.16	4	B	Phaophi 28	4	27	Thoth 1	Thoth 9	4	Mesore 9	Mesore 1	5	13
xli	140	5013	1009	Mar.21	3	A	5017	Athyr 24	3	34	1758	Mar.15	3	B	Chœac 2	3	34	Thoth 1	Thoth 9	5	Mesore 9	Mesore 1	5	14
xlii	112	5153	1149	Mar.21	2	B	5157	Chœac 28	2	34	1898	Mar.14	2	B	Tybi 6	2	34	Thoth 1	Thoth 9	5	Mesore 9	Mesore 1	5	15
xliii	140	5265	1261	Mar.21	1	C	5269	Tybi 25	1	27	2010	Mar.13	1	B	Mecheir 3	1	27	Thoth 1	Thoth 9	5	Mesore 9	Mesore 1	5	16
xliv	140	5405	1401	Mar.21	7	D	5409	Mecheir 29	7	34	2150	Mar.12	7	B	Phamenoth 7	7	34	Thoth 1	Thoth 9	5	Mesore 9	Mesore 1	5	17
xlv	112	5545	1541	Mar.21	6	E	5549	Pharmuthi 3	6	34	2290	Mar.11	6	B	Pharmuthi 11	6	34	Thoth 1	Thoth 9	5	Mesore 9	Mesore 1	5	18
xlvi	140	5657	1653	Mar.21	5	F	5661	Pharmuthi 30	5	27	2402	Mar.10	5	B	Pachon 8	5	27	Thoth 1	Thoth 9	5	Mesore 9	Mesore 1	5	19
xlvii	112	5797	1793	Mar.21	4	G	5801	Paüni 4	4	34	2542	Mar. 9	4	B	Paüni 12	4	34	Thoth 1	Thoth 9	5	Mesore 9	Mesore 1	5	20
xlviii	140	5909	1905	Mar.21	3	A	5913	Epiphi 1	3	27	2654	Mar. 8	3	B	Epiphi 9	3	27	Thoth 1	Thoth 9	5	Mesore 9	Mesore 1	5	21

SECTION V.—*Explanation of symbols used in the synopsis.*

A. Julian periods of the Fasti, and the number of mean natural years contained in each.

B. Noctidiurnal epoch, (epoch of the cycle of the leap day,) in the mean natural year, reckoned from the point of midnight 24 hours of mean time before the Julian date of the mean vernal equinox at the beginning of each period. The column of feriæ on the right shews its place in the order of feriæ at all such times perpetually.

BB. Julian date of the mean vernal equinox at the beginning of each period, reckoned from the point of midnight 24 hours of mean time later than B; or Julian date of the first entire period of 24 hours of mean time in the mean natural year, reckoned from midnight, at the beginning of each period. The column of feriæ next to this on the right shews its place in the order of feriæ at all these times perpetually.

D.L. Dominical letter, hebdomadal character or index, at the beginning of the first year of every period, and of the first year of every cycle of 28 years through the period; on which that of every other year in the period depends.

C. Cyclical date corresponding to BB at the beginning of every period. The feria annexed is its proper place in the order of feriæ at such times: and this it will be observed is always the same with that of BB.

CC. Nabonassarian date answering to BB also at the beginning of each period. The feria annexed is its place in the order of feriæ at such times: always the same both with that of BB and that of C.

G. Recession of the cyclical date of the mean vernal equinox at the beginning of every period, on the cyclical date of the same thing at the beginning of the period next after it. The epoch of this column is 0.

GG. Recession of the Nabonassarian date of the mean vernal equinox through successive periods under the same circumstances.

D. First day of the cyclical Thoth at the beginning of every period.

DD. Nabonassarian date answering to D.

DDD. Julian date corresponding to D and DD. The feria annexed to this is that of the other two also.

E. Nabonassarian Mesore 10 or 9, supposed to be nominally the same at the beginning of every period.

EE. Cyclical date corresponding at such times to E.

EEE. Julian date answering at the same times both to EE and to E. The feria annexed to this is common to the other two.

F. Standing difference between the first of the cyclical Thoth and the first of the Thoth of Nabonassar at the beginning of each period; and consequently between any cyclical term and the corresponding Nabonassarian one at the beginning of every period, and all through the period.

SECTION VI.—*On the cyclical and the Nabonassarian dates of the mean vernal equinox at the beginning of each period; and on the rule by which they are determined.*

That part of these Tables which relates to B and BB has been so fully considered and elucidated [a], that nothing more can be required in explanation of it here.

But with regard to that which we have marked C and CC, the mean vernal equinox, regarded whether as a natural or as a Julian term, for one of our periods at least is stationary: the equable exponent of it is necessarily a variable term, and cannot continue the same for more than four natural or four Julian years at most. A fixed Julian date then being given at the beginning of one of our periods in terms of the equable reckoning; if this is a period of 112 years, the recession of a given equable date on this fixed Julian one in the cyclical type will be 27 days, in the Nabonassarian 28: if it is one of 140 years, the recession in the former will be 34 days, in the latter will be 35.

If therefore this fixed Julian term at the beginning of the first of our periods was April 25 at midnight, and April 25 at midnight, as the first Julian representative of the mean natural vernal ingress, was capable of representing it at the beginning of every subsequent period also; the cyclical term, which coincided with April 25 and with the mean natural

[a] Dissertation vi. chap. iv. sect. iii–vii.

vernal ingress at the beginning of the first period, would recede ever after on both at the rate of 27 or of 34 days in every period: and the Nabonassarian at the rate of 28 or of 35.

It has been seen however that the Julian date of the mean natural vernal ingress, at the beginning of the first of our periods, must drop one day or one number in terms at the beginning of every subsequent period. If it was April 25 at midnight at the beginning of the first, it must be April 24 at midnight at the beginning of the second; and so on perpetually. It follows that the recession of the primary equable date of this natural term on the primary Julian one, through successive periods, must be one day less than it would otherwise have been. The same equable term, which would descend 27 days in a given time below April 25, will drop only 26 in the same time below April 24. The recession therefore of the equable date for the vernal equinox, whether cyclical or Nabonassarian, at the beginning of one of our periods, on the Julian exponent of the same natural term, in the course of this period, will be one day less than the recession through the period. If this latter is limited to 27 days the former must be limited to 26; if the latter cannot exceed 34 days the former cannot exceed 33. This distinction holds good in the Nabonassarian as much as in the cyclical equable type. If the Nabonassarian recession through a given period is 28 days, the recession on the Julian date of the vernal equinox in the same time will be 27 days: if the former amounts to 35 days the latter will be 34. The rule in short is invariable; and applies to both types of equable annual time in constant connection with natural and Julian alike. But the foundation of the rule in each instance is the fact that the Julian notation for the mean vernal equinox itself cannot be stationary from period to period; but must drop one number lower in every period.

This being the case, the Julian date of the mean vernal equinox at the beginning of the first of our periods, April 25 at midnight, and the cyclical date corresponding to it, Thoth 1 at midnight, both being given, and the length of the period, 112 mean natural or mean Julian years, being given also; in order to obtain the cyclical date of the mean

vernal equinox at the beginning of the next period, we have nothing to do but to count 26 days from Thoth 1, in the regular order of the equable notation; viz. to Thoth 27. Thoth 27 must be the cyclical date of the mean vernal equinox at the beginning of the second period, as truly as Thoth 1 at the beginning of the first; and this new cyclical term Thoth 27, reckoned from midnight, must answer as truly to the new Julian term for the same natural one of the mean vernal ingress, reckoned from midnight also, April 24, at the beginning of the second period, as Thoth 1 did to April 25 at the beginning of the first.

The rule is in fact invariable: That from the cyclical date of the mean vernal equinox answering to the Julian, at the beginning of one period, to the cyclical date answering to the Julian also of the same thing, at the beginning of the next, there must always be 26 or 33 days, according to the length of the period; just as we represent it in column G of our synopsis perpetually. The cyclical date therefore of the first mean vernal equinox at the beginning of the first of our periods being given; it is easy to obtain that of the mean vernal equinox at the beginning of every subsequent period: viz. by reckoning 26 or 33 days, according to the length of the period, from this primary cyclical term, in the order of the cyclical notation perpetually—that is upwards; just as it is represented in our synopsis under C throughout. The only observation necessary to be made on this process is that such is the rule *de facto* down to A. D. 225: but after A. D. 225, another rule comes into operation to direct the process, (though still an analogous one to this,) of which an explanation will be given by and by.

The dates under CC, proposed along with those in C perpetually, are obtained in the same manner. CC in each of these instances is the Nabonassarian date of the mean vernal equinox, answering at each of these points of time to the cyclical. The Nabonassarian dates recede one day more than the cyclical in every period. The Nabonassarian recession then on the mean vernal equinox is one day more than the cyclical in every period. From the first Nabonassarian term of this description, Mesore 10 at midnight, answering to the first cyclical, Thoth 1 at midnight, at the

beginning of the first period, we obtain the corresponding Nabonassarian term at the beginning of every subsequent period by reckoning on 27 days in CC where we reckon on 26 in C, or 34 in the former where we reckon 33 in the latter; but in the proper order of the equable style in the Nabonassarian type as much as in the cyclical.

SECTION VII.—*On the decursus of the cyclical and of the Nabonassarian dates of the mean vernal equinox respectively, through each period, in the order of feriæ.*

The cyclical date of the mean vernal equinox, at the ingress of successive periods after the first, thus obtained by one and the same rule, and the Nabonassarian date of the same natural term at the same point of time, obtained in a similar manner, it is manifest must be the same; each being equal to one and the *same third term* at the *same point of time,* whether the mean natural vernal equinox, or its proper Julian exponent at that point of time.

It follows that whatsoever be the feria of any one of these terms at such points of time, the same must be that of the other three; and if it has been already shewn[b] in what manner the feriæ of the mean natural vernal equinox or of its proper Julian exponent are determined at the beginning of every period after the first, and that, down to A. D. 225, without any interruption in the actual order of feriæ, and without any interruption in the nominal series of the Julian exponents of the mean natural vernal equinox itself, these latter must drop or descend two numbers in the order of feriæ with every period perpetually: the same thing it is evident must hold good of the two equable exponents both of this natural and of this Julian term perpetually, if they are to agree with each perpetually. That is, the feriæ of C and CC in our synopsis must be the same with those of BB all through; as it appears in fact that they are: and the order of feriæ itself remaining immutable and always the same, both C and CC must drop two terms in this order for every period, down to A. D. 225, as much as B and BB.

It is easy however to deduce this conclusion simply from the succession of equable annual time in the order of

[b] Supra, Diss. vi. ch. iv. sect. iii—vii.

feriæ; i. e. in the order of the hebdomadal cycle: having only the first equable noctidiurnal term in the succession and its proper place in the order of feriæ both given.

For let it be assumed that the first cyclical date of the first mean natural or Julian vernal equinox was Thoth 1 at midnight, and in the order of feriæ was the feria prima at midnight. Then at the end of the first period (112 years) the cyclical date of the same natural or same Julian term, according to the rule laid down, will be Thoth 1+26, that is, Thoth 27 at midnight; and its place in the order of feriæ will be the feria $1^a + 26 = 27^a$: from which if we cast off 21 = three cycles of feriæ, the remainder is 6; implying that its place in the order of feriæ at the beginning of the second period is and must be the feria sexta, if its place in the same order at the beginning of the first was the feria prima.

This being the case, we obtain the feria of the cyclical date of the vernal equinox at the beginning of every period after the first, by a very simple but infallible rule; viz. the addition of 5 to the feria of the same date of the same natural term at the beginning of the preceding period; and by casting off seven from the sum if necessary*. The advance of this date in the order of feriæ in each period on the feria of the same date at the beginning being always 26 or 33 terms, it is five terms more than a certain number of cycles of feriæ complete; which of course are to be neglected.

With regard to the Nabonassarian dates of the same things, (those which are marked CC and correspond to the terms in C throughout,) CC being absolutely the same in one of these styles as C in the other, there can be no difference between them in so essential a respect as that of the order of feriæ. A nominal disagreement between CC and C is possible, and may be admissible, without affecting their real agreement at bottom; just as in fact there is seen to be between C and CC from the first; the former of which begins nominally on Thoth 1, the latter on Mesore 10. And yet Thoth 1 at first was absolutely the same thing as Mesore 10; both being the equable representative of the same natural term at the same moment, the mean natural vernal

* It will be remembered that the proper feriæ of B and BB were obtained just in the same manner: see Dissertation vi. chapter iv.

ingress at midnight, and of the same Julian exponent of that term, April 25 at midnight, and of the same hebdomadal feria of that term, the feria prima at midnight. But a disagreement in the order of feriæ would be fatal to their real agreement in any sense: it would be no more admissible than a disagreement between them as to the natural term, or the proper Julian exponent of that natural one, supposed to be represented by them respectively. Accordingly it will be seen from the synopsis that in this respect there is no disagreement between them. The feriæ of C are the same with those of CC from first to last; and both are the same with those of BB.

And yet it might be concluded from that very fact, at first sight, that our Tables were not consistent with themselves, if they shewed this to be the case perpetually. For example, the recession of CC denoted by GG in the synopsis is always stated at one number more for every period, than that of C denoted by G; and the Nabonassarian dates of the vernal equinox, at the ingress of every period after the first, denoted by CC, are obtained by the constant addition of these numbers in GG to the dates in CC: and yet they answer perpetually to those in C, both being alike referred to BB. The rule therefore which determines the one is as true as that which determines the other; and therefore it might be supposed that the feriæ of these dates in CC must be obtained in a similar manner from these numbers in GG; that is, from the addition of 6 terms in CC, where we add only 5 in C; in which case the feriæ in CC could never be the same as those in C. They must be invariably one number higher in each instance.

The truth is, these feriæ in CC are thus obtained perpetually by adding 6 here where we add 5 in C; but this constant epact of 6 in CC at the end of each period is not added to the feria of the beginning, like the epact of 5 in C, but to the feria just before it: and 6 added to the next lower feria perpetually is the same thing as 5 added to the next higher. The reason of this distinction will appear as we proceed. We merely state the fact at present. It is simply resolvable into the circumstance that the Nabonassarian types in CC com-

pared with C perpetually are variable types of their kind; agreeing only in the possession of a common equable style or nomenclature in terms of the Nabonassarian. There is in reality the same difference between these successive Nabonassarian types as between our successive Julian types. Each of them enters our Tables in a state of equality to the cyclical for the time being; but each of them so that the first term in their proper notation corresponds to a different term in the cyclical, and to a term one number lower in each instance continually. It follows that the proper feriæ of such terms, which they borrow from the cyclical term to which they correspond, are one number lower than they would be at the same point of time in a fixed Nabonassarian type. And, as we have already stated, the constant addition of 6 to a lower term in the order of feriæ is just the same as that of 5 to the next above it *.

One remark more is all that is wanted to complete the explanation of this part of our synopsis; viz. That at the epoch of period xxviii, B. C. 672, Æra cyc. 3335, the advance in C, through the period, on the cyclical date of the vernal equinox at the beginning is one number less than in proportion to the length of the period; and in proportion to what the rule which determines it in every other instance appears to require.

The length of the xxviith period is 56 years; the recession in which would be 13 days, and the advance on the cyclical date of the equinox at the beginning according to the rule would be 12 days: but in the Table it is set down as only 11 days: and this in fact is the truth. For the Julian equinox at the same point of time in BB, for the reason so often explained, drops from March 30 to March 28: and if the cyclical term would have receded 13 days through the period

* The reader cannot fail to perceive that what is thus stated to hold good of the noctidiurnal succession in the Nabonassarian type of equable annual time is the same thing which we pointed out and explained in the note at p. 521, (Diss. vi. ch. v. sect. ix.) viz. that the noctidiurnal succession in the Julian year, before A. D. 225, is always 24 hours behind that in the natural. The succession in the cyclical type of annual time follows the law of the same thing in the natural; that in the Nabonassarian, the law of the same in the Julian.

on March 30, or 12 days on March 29, it must recede only 11 on March 28.

Besides which, at this moment, viz. B. C. 672, when the effect of both miracles was complete, it is as true that one actual cyclical term must have become equal to two mean terms, as that one actual Julian term must have become equal to two mean ones. This actual date, at the ingress of period xxviii, in the constant expression of Julian vernal equinoxes by cyclical, is Phaophi 19, which now takes the place of the mean Phaophi 20; just as the actual Julian March 28 in relation to the same natural term takes that of the mean March 29.

SECTION VIII.—*On the relation of the Nabonassarian type of equable annual time to the cyclical, as analogous to that of the Julian type of annual time of the Fasti to the natural.*

The result of the preceding comparison is to make it appear that the Nabonassarian type of equable annual time, incorporated in our Tables along with the cyclical, bears the same relation to the cyclical type of equable annual time as the Julian types of the Fasti to the natural type of annual time perpetually.

The cyclical type of the equable year is the standard of reference for the Nabonassarian; as the natural type of annual time is so for the Julian of the Fasti. The Nabonassarian type, once adjusted to this cyclical standard at the ingress of each of our periods, is as exact a representation of the decursus of equable annual time through the whole of that period, as the Julian type of the Fasti, similarly adjusted to its natural antitype at the same point of time, is of the decursus of natural annual time for the whole of the same period too. A succession of Julian types indeed is wanted to serve this purpose for each of our periods alike; and a succession of Nabonassarian types is necessary to serve the same purpose for each period also. But beyond this there is no distinction between them. The Nabonassarian type for the time being is just the same representative of the cyclical type of equable annual time, as the Julian type for the time being is of the natural year.

For example; the first of the cyclical Thoth Æra cyc. 1,

A. M. 1, B. C. 4004, being assumed to be April 25 at midnight, and the first of the Nabonassarian at the same time to be May 21 at midnight; the Nabonassarian term, which answered to the first of the cyclical Thoth at that moment of time, must have been Mesore 10 in the proleptical Nabonassarian year which came to an end May 21 at midnight. And both Thoth 1 in the cyclical style and Mesore 10 in the Nabonassarian at this moment coinciding with the Julian April 25 at midnight, and with the feria prima at midnight; can any one doubt that the 365 days, the proper measure of the equable year, reckoned from Thoth 1 in the cyclical style, and the 365, reckoned from Mesore 10 in the Nabonassarian, must have been the same? and both have begun and ended alike? notwithstanding this seeming difference between them, that the first of the one was Thoth 1 in its proper style, and the first of the other was Mesore 10 in *its* proper style too.

It follows, that if we supposed this cyclical type of origination, taking its rise on Thoth 1 in its proper style, at the beginning of our first period, to continue ever after the same *in terms;* it would be allowable to propose along with it a series of Nabonassarian types, each of them the representative of this fixed and invariable cyclical type, at the ingress of each of our periods after the first; and each bearing date on that day in the equable Nabonassarian style which was answering at the same moment of time to this first of Thoth in the cyclical. Such is the series which we exhibit in the divisions of our synopsis marked D, DD, and DDD perpetually.

The cyclical type in each of these instances is the same perpetually; bearing date on the same term in its proper style the first of Thoth, and being identical with itself all along. The Nabonassarian antitype of it is the representative of this fixed and identical cyclical idea at the ingress of successive periods too; only bearing date on that term in its own style at these points of time, which corresponds to the first of the cyclical Thoth at the same points of time also. Consequently at first on Mesore 10: and ever after, as the synopsis shews in DD throughout, on the next higher term by unity in the Nabonassarian style than Mesore 10, at the ingress of successive periods; but always on that term in the style of Nabonassar which is corresponding to the first of

Thoth in the cyclical at such times, just as much as Mesore 10 at first.

For that if the cyclical date of the period remains the same in terms the Nabonassarian must rise one number in each period, to continue to bear the same relation to it perpetually, after what has been explained is evident: the difference between the two types of equable annual time being simply this, that while the cyclical recedes on annual Julian time at stated times only one day in seven years, the Nabonassarian recedes upon it one day in four years perpetually. A fixed Nabonassarian term then like Mesore 10, which agreed with the first of the cyclical Thoth at the beginning of the first of our periods, at the beginning of the next must be found in agreement not with the first of the cyclical Thoth, but with the 5th of the cyclical epagomenæ; and only the next higher Nabonassarian term than itself, Mesore 11, must be found in agreement with the first of the cyclical Thoth at the beginning of the second period, under the same circumstances as Mesore 10 at the beginning of the first; and so on in every instance.

It must be evident however, notwithstanding this, that as the cyclical term, the first of Thoth, remains the same under all these circumstances, and as it is as truly represented by the corresponding Nabonassarian term at the ingress of one period as at that of another; the complex of equable annual time, reckoned from this first of Thoth in the cyclical style, or from this proper corresponding term in the Nabonassarian, at the ingress of every period and all through the period, undergoes no change, but is always the same with itself: and is always going on in both styles in a manner, if not absolutely, yet relatively, the same in each. No one at least can doubt that the 365 days reckoned from Thoth 1 at the beginning of the second period, and the 365 reckoned from Mesore 11 at the same moment, are just as much the same one with the other, as the 365 reckoned from Thoth 1 at the beginning of the first period, and the 365 reckoned from Mesore 10.

It is manifest also that, under such circumstances as these, it would be allowable to invert the state of the case which we have been supposing; and to conceive a fixed Nabonassarian type, one at least always bearing date on the same nominal

Nabonassarian term, that which agreed in the first instance with the first of the cyclical Thoth; viz. Mesore 10: and corresponding to this, a succession of cyclical types, each bearing date on that term in its own style at the beginning of every period, which at those points of time was answering to this fixed and invariable term in the Nabonassarian, Mesore 10. Such a series as this also do we exhibit in that other division of our synopsis, which is marked E, EE, EEE, perpetually.

It will appear from the inspection of this part, that the Nabonassarian term Mesore 10, which answered to the cyclical term Thoth 1 at the ingress of period i, nominally at least remains ever after the same; while the cyclical term which answered to it at first, beginning with Thoth 1, at the ingress of successive periods after the first drops or descends in its own style by unity, i. e. one number, for every period. The phenomenon therefore exhibited in this instance is the reverse of that which appeared in the former, and yet the reason of it is the same in this case as in the other; that as the Nabonassarian notation of equable time, in constant comparison with Julian, descends in its own style one day in four years perpetually, and the cyclical, similarly compared with the Julian, once in each of our periods descends only one day in seven years: it is impossible that the same nominal cyclical term should answer to the same nominal Nabonassarian one at the beginning of every period. If this latter remains nominally the same in its own style from period to period, the former must drop one day in its own notation lower and lower with every fresh period, to correspond to the latter perpetually. If it was Thoth 1 in the cyclical style at the beginning of the first period, it will be Epagomene 5 in the same style, at the beginning of the second, and so on in proportion perpetually; just as it is seen to be represented in E and EE of our synopsis, one compared with the other throughout.

Yet no one can doubt in this case, any more than in the preceding, that the reckoning of equable annual time itself is going on perpetually in each of these instances just in the same manner, from this nominally identical term in the Nabonassarian style Mesore 10, and from the variable cyclical term which at the ingress of particular periods is correspond-

ing to it. No one can question for example that, if 365 days reckoned whether from Mesore 10 in the Nabonassarian style, or from Thoth 1 in the cyclical, at the ingress of period i, must have been the same thing; 365 days, reckoned from this same term Mesore 10 in one style and from Epagomene 5 in the other at the ingress of period ii, must still be the same thing also. The period of 365 days under all circumstances must be the same with itself: and even in two parallel successions of this period, while the epoch of each remains the same in reality and retains the same relation to that of the other as at first perpetually, the successions themselves cannot differ. Now the cyclical Epagomene 5, at the ingress of period ii, is just the same thing in relation to the Nabonassarian Mesore 10 at that point of time, as the cyclical Thoth 1 at the ingress of period i. Both corresponded to the same Julian term April 25, and both to the same hebdomadal term, the feria prima, *then;* and both correspond to the same Julian term March 28, and both to the same hebdomadal, the feria septima, *now.* There cannot therefore be any difference between the 365 days reckoned whether from Mesore 10 or from Epagomene 5 now, and the 365 reckoned whether from Mesore 10 or from Thoth 1 before.

SECTION IX.—*On the equation of the fixed cyclical type to the variable Nabonassarian antitype; or* vice versa, *of the fixed Nabonassarian type to the variable cyclical antitype; at the ingress of period xxvii.*

In this manner and on this principle is it possible, as we have observed, and allowable also, to conceive the idea of two parallel successions of equable annual time, one that of a fixed cyclical type and of a corresponding variable Nabonassarian antitype, the other that of a fixed Nabonassarian type and of a variable cyclical antitype; both supposed to set out in the same state of equality one to the other, absolute or relative, at the ingress of the first of our periods, and both to go on in conjunction in the same state of equality as at first ever after, through successive periods: the former such as we exhibit in D, DD, DDD of our synopsis perpetually, the latter such as we propose in E, EE, EEE.

And though in the second of these representations we

speak of the Nabonassarian as the type and of the cyclical as the *antitype*, and of the former as fixed and of the latter as variable; it should be understood that this is only conventional language. The cyclical is the true type of the constant succession of annual equable time in this second representation as much as in the first; the Nabonassarian type of this succession is really not more fixed in this instance than in the former. In both these successions the standard of reference for the Nabonassarian type is the cyclical. In both the Nabonassarian borrows from this both its proper Julian date at the beginning of every period and its proper hebdomadal one also. There can be no question about the truth of this relation of the two successions to each other as represented by D and DD respectively, from the first; and there is in reality as little about it in E and EE compared with each other perpetually. For though the Nabonassarian type represented by E appears to be the same continually, this is merely because it bears date continually on the same nominal term Mesore 10: but that this term, though nominally always the same, is in reality always varying, because it is always changing its relation to something else which is invariable, appears from the fact of its corresponding to a proportionably different Julian term and to a different hebdomadal feria at the beginning of every period. The cyclical type indeed, represented by EE, cannot be considered fixed and invariable in the same sense as that which is represented by D: the latter always bearing date on the same cyclical term, the former on a different one. It is manifest however that it is really as invariable in itself as D; and it is in fact the same succession as D perpetually; only reckoned from a different epoch. It is at least merely that variable form of the cyclical succession, which even this must assume to adapt itself perpetually to the varying form of the Nabonassarian: and the Nabonassarian type of the succession, denoted by E, though nominally always the same yet being in reality always different, (without which perpetual change of its real nature under one and the same appearance of identity externally, it would not be competent to represent the true succession of equable annual time for more than a single period,) the cyclical in EE appears to vary also; though in reality it is always the same with itself,

and relatively if not absolutely it is always the same even with that in D.

Now the original difference between the first cyclical term in each of these parallel successions, Thoth 1, and the first Nabonassarian one, Mesore 10, having been 26 days, as we see it represented in the column marked F; and this difference in each succession, both that of D and DD and that of E and EE, being constantly diminished by unity at the ingress of successive periods after the first, as we also see it represented in F; it follows that in 26 periods it must be reduced to nothing: and therefore that at the ingress of the xxviith period the Nabonassarian succession in DD will be brought to par with the corresponding cyclical one in D, and the cyclical succession in EE to par with the Nabonassarian in E: so that at the ingress of period xxvii there will not be even a nominal difference between these successions any longer.

The inspection of both these successions in our synopsis at the entrance of period xxvii shews that this is actually the case. At this point of time the Nabonassarian epoch in DD is observed to have mounted up to Thoth 1; and there is now not even a nominal distinction between the Nabonassarian and the cyclical epoch, each in its proper style, while their real agreement continues the same as ever; both at this moment coinciding with February 21 at midnight, and both with the feria tertia at midnight also. At this moment therefore they are both absolutely and relatively the same. The same fact holds good of EE and E. The cyclical epoch in EE at the ingress of period xxvii is seen to have become Mesore 10; the same as the Nabonassarian in E from the first and still. There is now not even a nominal distinction between them. Their essential agreement all along continues the same. Each is now January 26 at midnight; and each is the feria quinta at midnight.

This xxviith period therefore, Æra cyc. 3279, A. M. 3277, B. C. 728, is manifestly the epoch of a coincidence, not relatively merely but absolutely, between one of these successions of equable annual time and the other; between that of D and that of DD, and between that of EE and that of E: the former the succession of a fixed cyclical type constantly com-

pared with a variable Nabonassarian one; the latter that of a variable cyclical type compared with a nominally fixed and identical Nabonassarian. And it is evident that no period before this either has been or could have been the epoch of such a coincidence. At this point of time then we might if we pleased equate the succession in D and DD to that in E and EE, or *vice versa;* viz. by giving 26 days both to E and EE, i. e. by advancing the epoch in E and EE from Mesore 10 to Thoth 1, and in EEE from January 26 to February 21, and from the feria 5 to the feria 3a. And thus all appearance of difference between E and EE and EEE, and D and DD and DDD, respectively would cease.

Section X.—*On the continuation of these parallel successions beyond the epoch of period xxvii: and on the change in the epoch of origination in E and EE at the ingress of period xxviii.*

We might thus as we have said equate these two successions, E and EE, D and DD, at this moment of the ingress of period xxvii, one to the other respectively; and so reduce both from this time forward to one, that of D and DD: or if we pleased we might treat them as distinct and independent successions as much after this xxviith period as before. This is what we have judged it most proper to do; and therefore we continue to exhibit both, beyond this epoch of period xxvii as well as before it, in the third and fourth tables of the synopsis, parallel indeed to each other but one distinct from the other.

One explanation only is necessary here: viz. that at the ingress of period xxviii Æra cyc. 3335 A.M. 3333 B.C. 672, a change taking place in the primary epoch of the entire Julian succession in BB, from April 25 at midnight to April 24 at midnight, a corresponding change must take place at this point of time too in the epoch of E, from Mesore 10 to Mesore 9, and in that of EE from Mesore 9 to Mesore 8. If the proper Julian epoch of origination is April 25, the proper cyclical one must be Thoth 1, and the proper Nabonassarian one Mesore 10: but if April 25 drops to April 24 Thoth 1 must drop to Epagomene 5, and Mesore 10 to Mesore 9. This change as we have seen is to be supposed to

have actually taken place in the Julian epoch at the ingress of period xxviii; and therefore a corresponding change must be assumed at the same time in the cyclical and in the Nabonassarian. Yet no change takes place at the same time in any of these successions in the feria of the epoch; so that April 24 at this point of time, and henceforward, is after all the same thing as April 25 before, Epagomene 5 in the cyclical style as Thoth 1, and Mesore 9 in the Nabonassarian as Mesore 10. The epoch of the entire succession in E however from this time forward is Mesore 9 in its proper style, for the very same reason for which it was Mesore 10 before.

SECTION XI.—*On the continuation of the two successions down to the epoch of period xxxv.*

The two successions in D and DD and in E and EE, thus continued beyond each of these periods, both period xxvii and period xxviii, proceed as before; preserving the same relation to each other in all respects but this of the epoch, Mesore 9 in E instead of Mesore 10; down to the ingress of period xxxv, Æra cyc. 4232 A. M. 4229 A. D. 225.

And this as we have often observed being the actual epoch of the Julian reckoning of annual time which is in use at present, and virtually that of the Gregorian also, the Julian type of our Fasti for the time being now assumes the form of the actual Julian, which it can never again lose while the actual Julian continues to be in existence; and in like manner the variable succession of such types, which still continue to enter our tables from this time forward as much as before, is virtually now identified with the Gregorian; preserving and exhibiting the same relation from this time forward to the Julian type of period xxxv, as the actual Gregorian type of annual time does to the actual Julian.

A corresponding change therefore must take place at the same point of time in the two successions of equable annual time, both that of D and DD and that of E and EE. The cyclical type of each (both D and EE) from this time forward, (that is, after period xxxv,) must become properly referrible to our variable Julian types, later than this epoch of period xxxv, regarded as no longer Julian but as Gregorian; and the Nabonassarian in DD and E must hence-

forward be referrible to the type of period xxxv itself, as from this time forward fixed, and as the same perpetually with that of the actual Julian year.

And now too if we pleased at this common epoch of the ingress of period xxxv, A. D. 225, before either set out in this new state of relation to the other, we might equate the succession in E and EE as before to that in D and DD, by raising the epoch in E 27 days from Mesore 9 to Thoth 1, that in EE 27 days from Mesore 1 to Mesore 28, and that in EEE 27 days from June 1 to June 28, and the feria common to them all, (the feria 4[a],) 27 days, to the feria 3[a]. Or we might prefer to let every thing remain as it has been until now, and to leave the two successions to set out from this new epoch of period xxxv, A. D. 225, in the same state of relation to each other absolute or relative as before. And this is what we have thought it best to do; as our synopsis shews.

Section XII.—*On the comparison of the two successions, and on the proper administration of each, from the epoch of period xxxv, A. D. 225 downwards.*

We make a slight change in the meaning of the symbols which we retain in the concluding table of our synopsis; viz. the fourth.

B now stands over the Gregorian succession of the mean vernal equinox, as supposed to have been always the same and always properly represented by the same Julian or the same Gregorian term from the ingress of period xxxv downwards, viz. March 21; which was the proper Julian exponent indeed of that natural term at the ingress of this period, and all through this period; and therefore could first become the proper Gregorian representative of it, under the same Julian name, only at the ingress of period xxxvi.

BB is now the series of cyclical dates, which at the beginning of each period from the xxxvth downwards correspond successively to this fixed Gregorian date of the mean vernal equinox, March 21.

C is the proper Julian date of the mean vernal equinox at the beginning of every period from the xxxvth downwards; decreasing by unity with every period on this Julian date at the beginning of period xxxv, March 21.

CC is the Nabonassarian term at the beginning of each period from the xxxvth downwards, corresponding to C.

D is the Gregorian notation of Thoth 1 in the cyclical style, from this time forward, and DD is the Julian notation of the corresponding Nabonassarian term Thoth 9. The difference between them from this time forward is represented by F. EE in like manner is now to be referred to the Gregorian notation of the cyclical Mesore 1, E to the Julian of Mesore 9; the difference between these two also at the beginning of each period being henceforward represented by F.

The first remark which we have to make upon this part of our synopsis is *this:* That as the equable year under all circumstances is one and the same thing in itself, never consisting of more or less than 365 nights and days, and as the cyclical type of that year in this respect never has differed hitherto, nor ever could have differed, from the Nabonassarian, or *vice versa* the Nabonassarian from the cyclical; it follows that, while each continues to be the same representative of the equable year in this sense perpetually, neither can they differ in that respect from this time forward. If the cyclical type of this year then is setting out at the epoch of period xxxv, in a certain state of relation to the Nabonassarian, and the Nabonassarian at the same point of time in a certain state of relation to the cyclical, (but one in the same state of relation to the simple Julian year from this time forward, and the other in the same to that which differs only *per accidens* and in appearance, but never in reality, from the simple Julian year, viz. the Gregorian;) it follows that there can be no difference from this time forward between these two types of equable annual time, except that which exists between them at the epoch of period xxxv itself.

The extent of this difference at that time is indicated by D and DD or by E and EE. It amounts to eight equable terms but no more; and eight in excess on one side, and eight in

defect on the other. The Nabonassarian Thoth at this moment is eight terms in its proper notation lower than the cyclical; and the Nabonassarian 1st of Mesore than the cyclical. The Julian date of the Nabonassarian Thoth at this moment is June 28; that of the cyclical is July 6; between which the difference is eight. The feriæ of each differ in the same proportion; that of the Nabonassarian Thoth is the feria 3, that of the cyclical the feria 4; and $3+8=11=7+4$. The existing difference then between the two styles of the equable year at the ingress of period xxxv is eight; and if the two types of equable annual time from this time forward must not only continue each to preserve the same relation to the equable year as before, but one of them also the same relation to the Gregorian type of natural annual time, the other the same to the Julian, the relation of each of which to the other is fixed and invariable; it follows that there can never be a greater difference between them, from this time forward, than this original one of eight terms in excess and in defect respectively.

The actual difference between them at the beginning of each period after the xxxvth, is represented by F. The difference shewn in this column at the beginning of period xxxv is eight; and that is agreeable to the distinction which has just been explained, or to the actual state of the case with respect to these two types at the ingress of this period itself. But at the beginning of the next period the difference shewn by this column is 9, that is, one more than eight; and at the beginning of the next it is 10, two more than eight; and so on, increasing by unity with every period: so that, at the beginning of the last period which enters our tables, it appears to have accumulated to 21; 13 terms more than the difference at the beginning of period xxxv. And this appears to be contradictory to what we have just concluded; viz. that the actual difference between the two types of equable annual time, setting out in conjunction with each other and with the actual Gregorian and the actual Julian year at the beginning of period xxxv, under the circumstances which have been pointed out, never could exceed eight terms in excess in one side and in defect on the other.

The explanation of this phenomenon is that the terms in

this column F are in reality the terms which express the difference between the Gregorian and the Julian dates of the first of Thoth in the equable style respectively, at the beginning of every period. This difference began with being eight, at the ingress of period xxxv. The Julian date of the cyclical Thoth at that time was July 6; that of the Nabonassarian June 28. It goes on increasing at the rate of one day in excess in the date of the cyclical, or one in defect in that of the Nabonassarian, for every period subsequently. The Gregorian and the Julian dates respectively go on rising and falling in the same proportion, one day in each period also. Every one knows that this is a necessary consequence of the difference in the Julian rule of the administration of annual time from that of the Gregorian, and *vice versa*. Every one knows too that it implies no real or essential difference between a given Gregorian and a given Julian term at a given time; the test and criterion of which real agreement, amidst this seeming difference, perpetually is the *feria* common at all times under the same circumstances to both. And this criterion holds good of both our successions of equable time after A. D. 225 perpetually; both that of D and DD, and that of E and EE: for we have only to look at the table to see that, notwithstanding the seeming difference between them indicated by F, the feria of D at the ingress of every period is always the same with that of DD, and that of EE with that of E. The original difference of the feria of the cyclical 1st of Thoth and that of the Nabonassarian at the ingress of period xxxv, as we have seen, was eight terms; the former being the feria 4ª, the latter the feria 3ª, and $4-8$ in the order of feriæ being $=3$. Our general tables will shew that this proportion between them after A. D. 225 is maintained perpetually; and that whatsoever is the feria of the first of the cyclical Thoth, at the beginning of any year after A. D. 225 Æra cyc. 4232, that of the Nabonassarian is the feria next lower than it.

The true relation of these two types of equable annual time one to the other perpetually, after the ingress of period xxxv, is shewn by the cyclical dates in BB compared with the Nabonassarian ones in CC, at the beginning of every subsequent period. The former are the equable dates, which

answer at such times to the Gregorian equinox, March 21, perpetually; the latter are those which answer to the Julian: both consequently are the equable exponent of the same fixed and invariable natural idea and natural term, the former through a nominally identical Julian term for it in every instance, the latter through a variable one. There is a difference between these equable dates in BB and those in CC; but it is always the same. The former are always eight terms higher than the latter; but if they are never less than this, neither are they ever more. The first cyclical term of this description is Pachon 19, (that at the ingress of period xxxv;) the first Nabonassarian one is Pachon 27: the last of the former kind, viz. that at the ingress of period xlviii, is Epiphi 1, the last of the latter, viz. that at the same point of time, is Epiphi 9. The difference begins and ends with being 8.

The feriæ attached to these equable representations of the Gregorian equinox in BB, and those attached to the equable expressions of the Julian in CC, are the same perpetually, as they ought to be; the feria of the Gregorian equinox itself and that of the Julian at the beginning of each period being the same too.

These equable dates in BB are of course the cyclical terms for the mean vernal equinox at these times; those in CC are the Nabonassarian. We obtain each of these in successive instances from the same things in the preceding instance by just the same rule. The recession of the cyclical date of the vernal equinox at the beginning of the period, in BB, is one day less than the recession on a given Julian date through the period; 34 days where the latter would be 35, and 27 where the latter would be 28. It is no more in CC: because the Julian date of the vernal equinox itself falls back one day in the course of every period on what it was at the beginning. We have nothing to do then but to add 34 or 27 to the equable date of the equinox, whether cyclical or Nabonassarian, at the beginning of one period, and we shall get the equable date, whether cyclical or Nabonassarian, of the same natural term at the beginning of the next. The same process it is evident will obtain the feria also of this equable date at the beginning of the next period from its

feria at the beginning of the one before; just as we see both these, and the equable dates to which they belong, obtained and represented perpetually in BB and CC respectively.

We are not aware that any thing more is now necessary to make this last part of our synopsis fully intelligible. We presume that it cannot be requisite to explain why the feriæ of E and EE must always be the same with those of D and DD. Both are ultimately resolvable into the fundamental relation of the feria of Thoth 1 in the cyclical, to that of Thoth 1 in the Nabonassarian, style at the ingress of period xxxv; which as we have seen is one of 8 terms in excess and in defect in the order of feriæ respectively: a relation which is never afterwards disturbed. Now it is evident that Mesore 9 in E is just 35 terms lower in the Nabonassarian style than Thoth 9 in DD; and Mesore 1 in EE, is just 35 lower in the cyclical than Thoth 1 in D: so that the feria of Mesore 9 in E must necessarily be the same as that of Thoth 9 in DD; and that of Mesore 1 in EE as that of Thoth 1 in D.

As to the reason why these feriæ, both in D and DD, and in E and EE, appear to be the same or stationary for a certain number of periods, and then to rise one number higher; we have explained it in the General Introduction to our tables, where we were treating of the hebdomadal cycle of the equable year: and to that consequently we refer our readers[o].

CHAPTER III.

On the relation of derivative calendars to the primitive or primary: and on the classification of derivative calendars thence deducible.

SECTION I.

A very important part of the subject on which we have been engaged hitherto still remains; viz. The relation of derivative calendars to the primitive or primary calendar, and in what manner that must have been determined as the ne-

o Introduction, part ii. ch. iii. sect. vii.

cessary consequence of the principles which have thus been explained; and ultimately the classification of all such calendars, deducible from these premises. To this therefore we must now proceed.

i. First of all we observe that the 48 periods, comprehended in our different tables, from the epoch of period i B. C. 4004 to that of period xxvii B. C. 728, and from the epoch of period xxvii B. C. 728 to that of period xxxv A. D. 225, and from thence to that of period xlviii A. D. 1905; these several periods we say must comprise the entire course of annual time in each of its forms or measures, natural, Julian, or equable, from the beginning to the present day. If it is true then that every calendar, different from the primitive, nevertheless took its rise out of the primitive, the epoch of derivation of every such calendar, which has ever existed or which still exists, the particular year in which it took its rise out of the primitive, must be found in some one of these periods, or other. It is of no consequence in what particular period, or in what particular year of the period; only it must have been in some one of the number, whatsoever that may have been. The oldest calendar so derived, which we meet with, is not older than the 113th year of the xviith period B. C. 1848: the latest is not younger than the 36th year of the xlivth A. D. 1436. But all these distinctions are accidental.

ii. In each of these cases if the derivative calendar actually took its rise from the primitive, it must have done so on some particular day in the primitive year. On what particular day might not signify. It might be on the first of the primitive Thoth; and *a priori* it is more probable it would be on the 1st of Thoth than on any other day in the year. But even this is no necessary consequence. All that is necessary and inevitable is that the first day of the new calendar must have been some particular day of the old; and thus the relation of the derivative calendar to the primary would be determined in a certain manner from the first, and by the very act and process of the derivation itself.

iii. The epoch or first day of the derivative calendar in all such cases being taken from the primitive, and therefore from some term in the equable style of the calendar, it

must have from the first a proper Julian date, and a proper hebdomadal date; because every equable date, and at every period of the decursus of the equable calendar from first to last, always has had and always must have such a proper Julian and proper hebdomadal date. And this Julian and this hebdomadal date, (by which last we understand the feria common to both the equable and the Julian date of origination at that point of time,) must be the proper characteristic distinctions of one such derivative calendar from another; all considered as taking their rise ultimately out of the same primitive calendar itself: characteristics which will identify them with this common original at the time of their derivation from it, but will discriminate them from every thing else of the same kind, derived from this common original as well as themselves, but not at the same point of time. These criteria of its own original and of the circumstances under which it took place the derivative calendar must borrow from the primitive; but the primitive calendar itself must derive them at such points of time from nothing but the constant succession of true equable time, in the sense of cyclical, in true natural, in the sense of Julian, and in true noctidiurnal, in the sense of hebdomadal, from the first till then.

iv. But besides this cyclical date of origination and the corresponding Julian and the corresponding hebdomadal one at all such times, the derivative calendar must have also a proper Nabonassarian date; viz. that term in the equable succession of noctidiurnal and annual time, in the sense of Nabonassarian, along with the same succession, in the sense of cyclical, from the first until then, which at this epoch of origination is coinciding with the cyclical date of derivation itself. For every cyclical date from the first, as we have seen, has had and must have had a proper Nabonassarian one corresponding to itself. The only distinction of this kind is that as the cyclical type of the equable succession down to A. D. 225 is the only true type of that description; the proper equable date of origination in all cases older than A. D. 225 must have been supplied by the cyclical type of equable time; the Nabonassarian only through that.

It follows that every derivative calendar, obtained under

such circumstances from the primitive, must have had both a proper cyclical date of origination, taken directly from the true equable succession of noctidiurnal and annual time from the first till then; and a proper Nabonassarian one, derived from the parallel succession of equable Nabonassarian time in constant subordination to cyclical; and a proper Julian and a proper hebdomadal date, taken directly from the true succession of equable time, (in the sense of cyclical,) both in Julian and in hebdomadal from the first until then, but at this particular point of time common through the cyclical also to the Nabonassarian. So that in point of fact the characteristics of all such derivative calendars, at the time of their derivation, must have been four: a proper cyclical date of origination at the time; a proper Nabonassarian one answering to this cyclical one; a proper Julian and a proper hebdomadal answering to both: characters and criteria these, abundantly sufficient to stamp every derivative calendar both at the time and ever after with an indelible mark and impress of its own, incapable of being shared with any other, even though similarly derived from the same source yet not at the same time nor under the same circumstances.

v. Again, whensoever these derivative calendars in a particular instance might take their rise from the primitive, and whether on the first of Thoth or on any other day in the primitive year; yet as they had both a cyclical date at such times and a Nabonassarian one corresponding to it, and a Julian and an hebdomadal one answering to each; it must be indifferent *per se*, which of these two is to be regarded and treated ever after as the epoch of origination: whether the cyclical date at the time or the Nabonassarian: and therefore as all derivative calendars are necessarily comprehended in our different periods, in D and DD or in E and EE respectively; the epochs of all might be as truly represented by one of these Tables as by the other.

vi. Again, calendars derived from the primitive, under whatsoever circumstances of relation to it at the time, yet in the manner thus described, having thereby obtained a proper cyclical date of origination from the first, analogous to that which we represent in D perpetually, and a Nabonas-

sarian date, analogous to that which is similarly represented in E; these dates must ever after follow either the law of succession in D and DD, or the law of succession in E and EE: that is, either the cyclical date must ever after remain the same, as in D, while the Nabonassarian corresponding to it is perpetually changing, as in DD, or the Nabonassarian date must be fixed in terms, and nominally always the same, as in E, and therefore the cyclical, corresponding to it, must nominally always be changing, as in EE. One of these alternatives in every such case of a calendar derived from the primitive, with a double date of origination of this kind, must hold good; either the cyclical date of origination must ever after remain the same in terms, or it must not. If it remains the same, the Nabonassarian, which corresponded to it at first, must vary. *That* cannot continue the same in terms, and agree to the cyclical still perpetually. In this case the relation of the two to each other, *mutatis mutandis*, will be exactly the same as that of D and DD; only that it will not be necessarily Thoth 1 in the cyclical, and Mesore 10 in the Nabonassarian, style of the same thing, which are thus perpetually compared together. It may be some other cyclical term and some other Nabonassarian; one bearing the same relation to the other at the epoch of origination, as Thoth 1 cyclical to Mesore 10 Nabonassarian at first.

On the other hand, if the cyclical date of origination does not ever after remain the same, or what amounts to the same thing, if the Nabonassarian date of origination is given in terms ever after, and is always thenceforward the same; the cyclical which corresponded to it at first cannot continue the same in terms. It must go on varying from what it was at first, and varying in defect; that is, by dropping lower and lower upon itself, one number for every period. In this case the relation of the two successions, one in the Nabonassarian, the other in the cyclical, form of the same thing, one to the other ever after, *mutatis mutandis*, must be analogous to that of the two successions which we have exhibited in E and EE respectively from the first.

In short, though this case is the reverse of the former, the principle of the relation is the same in this as in that. One and the same rule applies to both. If the cyclical date of

origination is given in terms, and is ever after nominally the same, the Nabonassarian epoch of origination, corresponding to it at first, must rise nominally in terms and in its own style, one number higher for every period; and the succession of the two together ever after, *mutatis mutandis,* must be analogous to that of D and DD. If the Nabonassarian date of origination is fixed in terms, and is nominally the same ever after, the cyclical, corresponding to it at first, must descend in its own notation one term lower with every period, in order to correspond to it still; and the relation of the two successions, under such circumstances, *mutatis mutandis,* must be exactly the same as that of E and EE, one to the other, from the first.

vii. In all these cases the Nabonassarian epoch of origination is the proper representative of the Julian also; equable time in the sense of Nabonassarian by hypothesis being referred perpetually to simple Julian time. A given Nabonassarian term therefore in any of these instances, having necessarily coincided with some particular Julian term at first, must be considered to bear the same relation to it ever after; with this difference only, that while this Julian term will remain nominally always the same, the Nabonassarian corresponding to it at different times will be nominally different; because no given equable term can perpetually represent the same given Julian term. But there will always be *some* Nabonassarian term to answer to the *same* Julian term at a given time, just in the *same* manner as *some* other before it at a corresponding point of time. This Nabonassarian term in the abstract is the perpetual representative of the Julian date of origination; and as we have seen that, if the cyclical date of origination remains nominally the same ever after, the Nabonassarian must rise in its own style at a certain rate ever after, the same will hold good of the Julian epoch of origination also. That too must rise one number for every period in the Julian style, to keep pace with the Nabonassarian, and through that with the cyclical. If the Nabonassarian epoch is ever after fixed in terms, so must the Julian be. We may lay it down therefore as a general rule, applicable to all parallel successions of these kinds under all circumstances alike, down to the epoch of period xxvii at

least, that if the cyclical dates of origination in any of these instances are stationary from the first, (that is, given in terms and nominally always the same,) the Julian dates must rise one term for every period: if the Julian dates of origination are nominally the same ever after, the cyclical must descend one number for every period.

viii. A very important inference is deducible from this conclusion, by way of corollary; viz. That if the proportion of the cyclical and the Nabonassarian dates of origination, (and under these latter we include the Julian,) one to the other in a particular instance is known; the actual proportion of the actual epochs at any subsequent point of time is a test or criterion of the duration of the calendar meanwhile. A difference of one term or of one day in the subsequent proportion of these epochs one to the other is equivalent to the lapse of one of our periods; a difference of two to two periods, and so on. Suppose it known, for example, that the original proportion of the proper cyclical epoch of the Egyptian cycle of Apis to the proper Nabonassarian one was that of Thoth 11 to Thoth 9; and yet that at the epoch of period xxvii it was discoverable that this proportion *de facto* was that of Thoth 11 to Thoth 11, two numbers higher than at first; this would be an infallible argument that the date of this cycle must have been two periods older than period xxvii; consequently some time in period xxv. And this, as as we shall see hereafter, would be strictly in agreement with the truth.

The result is the same if we take the test from the Julian, not from the Nabonassarian epoch of origination; and from its relation to the cyclical at first and subsequently. A given lunar date is tantamount to a given Julian one. Let it be supposed to be known then that the lunar date of origination of the Apis cycle was the luna 3ª dated from the conjunction; the luna 2ª dated from the phasis; yet that, at the ingress of period xxvii and ever after, it was known to be *de facto* the luna 5ª, or the luna 4ª. This would demonstrate that it had risen two terms on the epoch of origination. If so, that two periods must have elapsed from the epoch down to period xxvii; in other words, that this cycle itself must have come into being some time in period xxv.

ix. The case which we have just been supposing, that of the cyclical date of origination's becoming thereby fixed ever after in terms, and nominally always the same, though not unexampled, is rare of occurrence. The Apis cycle of the Egyptians, and that of the Chaldeans, and that of the Chinese, are all the cases of this kind which have come to our own knowledge, down to the epoch of period xxvii. And it is almost self-evident that the cyclical date of a lunar cycle like this, derived from the primitive solar calendar, and intended to accompany it ever after, howsoever determined at first by the particular relation of the lunar to the solar dates at the time, must continue nominally the same.

The other case on the contrary, that of a Nabonassarian date of origination, or what amounts to the same thing in effect, a Julian one, which is given in terms and fixed by the fact of the origination itself, and remains ever after nominally the same, is of frequent occurrence. Almost every calendar, derived from the primitive, supplies an example of it. The whole of that comprehensive class at least, which we have denominated cyclico-Julian, are instances of it; and even all those cases of purely Julian calendars, derived from the primitive yet not substituted for it, which we enumerated supra [h].

In all these cases alike, the Julian epoch of origination, whatsoever it was, remaining nominally the same ever after, notwithstanding the constant change and constant succession of Julian types going on meanwhile; the Nabonassarian epoch of origination is fixed in proportion, and rendered the same ever after also; so at least as to be always the same Nabonassarian term which is properly answering to the same Julian, under the same circumstances of the proper succession of equable Nabonassarian time along with Julian perpetually. And in each of these cases alike, whatsoever the actual Julian, and the actual Nabonassarian, and the actual cyclical date, from which they take their rise respectively; the relation of the succession of equable time in the sense of Nabonassarian, and of Julian, one to the other, and that of both to equable in the sense of cyclical, ever after, *mutatis mutandis*, is and must be exactly the same as that which we

[h] Diss. vii. ch. ii. sect. iii. p. 552 sqq.

have exhibited in our synopsis in E, EE, and EEE from the first.

x. Every form of derivative or secondary equable time, both cyclical and Nabonassarian in conjunction, later than the beginning of each of these kinds of time at first, necessarily following the same law of succession as D and DD, or as E and EE, down to the epoch of period xxvii at least; it follows that the fact, which holds good of both the primary successions of this kind, D and DD and E and EE, at the epoch of this period, must hold good of every secondary form of the same succession, at the same point of time also. This fact is that at the ingress of period xxvii, both the succession in D and that in DD, and the succession in E and that in EE, each of which had been nominally distinct from the other until then, though really always the same with it, became one and the same even in name and appearance; and the effect was the same as if, in one of these instances, DD had been traced perpetually along with D in the form of Thoth 1 instead of Mesore 10, or EE in the other had been traced continually along with E, in the shape of Mesore 10, instead of Thoth 1.

The same fact then must hold good of every derivative or secondary form of equable time both cyclical and Nabonassarian, posterior to period i, but anterior to period xxvii, which might have risen up meanwhile. Whatsoever the cyclical date of origination in such cases, and whatsoever the Nabonassarian, and whichsoever of these is to be supposed to have become thereby fixed in terms and nominally the same ever after; the same effect both would be and must be brought about at last: viz. that, at the epoch of period xxvii, this cyclical date and this Nabonassarian one must be found to be no longer distinguishable even in name. One must be seen to coincide with and one to be absorbed in the other, and one to be convertible into the other. And while the essential agreement of one with the other neither was nor could be made greater by this coincidence than it had been before, all nominal or seeming, and consequently merely accidental, difference between them until then at this moment would disappear.

This being the case it is evident that as all calendars, derived

from the primitive before this point of time, must have acquired by the fact of that derivation, and at the proper point of time when it took place, a proper cyclical date of origination, and a proper Nabonassarian date also, under both of which in conjunction they must have proceeded ever after, either in the form of D and DD or in that of E and EE, down to the epoch of this period; this period must have served as a focus or point of convergence for them all. To this they must all have tended perpetually from the moment of their coming into existence; and in this they must all have met at last; and during this they must all have assumed and all have exhibited a common form both of the cyclical and also of the Nabonassarian succession of equable time from the first until then.

This we say is a necessary inference from the above premises; and a very important inference too. We see it hold good in D and DD at the epoch of period xxvii. The Nabonassarian Thoth 1 in DD at this point of time is assimilated in all respects to the cyclical Thoth 1 in D. The same is just as true of the cyclical Mesore 10 in EE, and of the Nabonassarian Mesore 10 in E, at the same moment likewise. It must have held good at the same point of time of any successions similar in principle to that of D and DD, or to that of E and EE, respectively; which we might have substituted previously for them.

It follows that, whatsoever the actual epoch of origination, or of derivation from the primitive calendar, in any of these instances prior to period xxvii might have been; this period must be considered virtually the epoch of all; the epoch at least of the first actual assimilation of one and the same succession of things, both in the equable cyclical and in the equable Nabonassarian type of that succession, and in the Julian and in the hebdomadal, alike adapted perpetually to each. It follows too, in the case of a given calendar which might never have undergone any change from its primitive state until then, (as for example the Egyptian,) that, having been brought down from the first until then in both types of equable time, it would be found to be entering our tables at this moment in the same form in each; nor could there be any doubt that the true succession of equable time from the

first, in constant connection with true Julian and true hebdomadal until then, might be carried on in such a calendar at this moment of time, either in the cyclical type of the succession or in the Nabonassarian indifferently.

It follows therefore that at this point of time, (the ingress of period xxvii,) a Nabonassarian type of equable annual time bearing date on Thoth 1, and therefore beginning and proceeding in strict conformity to the proper equable style of annual time all round the year, comes into actual existence along with a true cyclical type of the same thing which from the first has never varied from itself or from the truth; and that, from the beginning to the end of this period, true equable annual time, according to its proper law, is *de facto* the same by whichsoever of these types it is supposed to be measured; and proceeds alike in each. And as every Nabonassarian type, which has once entered our tables in any state of relation to the cyclical, may be regarded as thenceforward always the same with itself nominally and in terms at least, and as always retaining the same relation to the cyclical; it follows that this type, which enters our tables at the ingress of period xxvii, on the first of Thoth in its own style, along with the cyclical on the first of Thoth in the equable, acquires thereby a right and a title to keep possession of our tables under the same style in its own notation, and yet in the same relation to the cyclical, ever after, as before.

Every one at least must see that at the end of period xxvii and at the beginning of period xxviii it would be optional under such circumstances whether we should continue the succession of equable time in this Nabonassarian type of Thoth 1, or in the cyclical type of Thoth 1; only that at this particular epoch of the ingress of period xxviii the Nabonassarian Thoth 1 would be found to have dropt to par with the cyclical Epagomene 5, and the cyclical Thoth 1 to be consequently now at par with the Nabonassarian Thoth 2: while in all other respects the succession of equable time would go on in both these types all through period xxviii, exactly as it had done before through period xxvii; and equable time dated from Epagomene 5 cyclical would be exactly the same all through this type as equable time dated from Thoth 1 of

Nabonassar: or, if dated from Thoth 1 in the former, altogether the same as the same kind of time dated from Thoth 2 in the latter.

In like manner, at the epoch of period xxix, Thoth 1 of Nabonassar would enter our tables in a state of equality to Epagomene 4 cyclical; and Thoth 1 cyclical in a state of equality to Thoth 3 of Nabonassar: yet the same relations of agreement between the two styles would hold good all through this period, as much as all through either of the preceding. Nothing would differ but the cyclical epoch of the same Nabonassarian term Thoth 1, or the Nabonassarian epoch of the same cyclical term Thoth 1. And this process would go on and be repeated in successive periods down to the ingress of period xxxv; when Thoth 1 of Nabonassar would be found entering the tables in a state of equality to Mesore 28 cyclical, and Thoth 1 cyclical in a state of equality to Thoth 9 of Nabonassar. And this period being the date of the actual Julian reckoning of annual time, and virtually of the actual Gregorian, the former of which from this time forward is the standard of reference for the continued succession of Nabonassarian time and the latter for that of cyclical; the difference existing between these two types of equable annual time at the ingress of period xxxv, as we have already shewn, would now become a constant quantity, which could never after be either greater or less than what it was at that moment.

It is to be observed however that the Nabonassarian type of equable annual time, which comes into existence at the epoch of period xxvii, having thereby been rendered perpetual, and nominally always the same; the Julian term corresponding to the first of Thoth, in that type and at that moment also, is fixed and perpetuated likewise. For these two things, as we have already explained their relation one to the other, are virtually the same all through, even when nominally different: the same Nabonassarian term and the same Julian: a variable Nabonassarian term and a variable Julian one.

The consequence of this fact is that even in such a succession of the two types of equable time, one distinct from the other, as we exhibit in D and DD, in which the cyclical date of origination by hypothesis remains the same, and the Na-

bonassarian and Julian answering to it are perpetually rising; this rise could go on only down to the epoch of period xxvii. At that point of time it must cease; at least if the Nabonassarian type which enters the tables at that time in the form of Thoth 1 = Thoth 1 of the cyclical, and consequently the Julian term which enters along with it, agreeing to both at the time, is thenceforward fixed in terms, and is nominally always the same. The Nabonassarian Thoth 1 remaining nominally the same all through this period, the Julian term which answered to it at the beginning remains the same also; because the relation of a given Julian term to a given Nabonassarian one must always continue the same; though we have said enough to convince the reader that, notwithstanding this nominal identity of each with itself perpetually, yet down to the epoch of the xxxvth period, A. D. 225, the real value of both is perpetually undergoing a change; the test or criterion of which in the case of the Nabonassarian is the difference in the cyclical terms, to each of which it is standing successively in the same relation at the ingress of successive periods; and in the case of the Julian is the difference of feriæ, with which it is successively coinciding at the same points of time alike. But these differences affect them both in the same manner; and therefore do not interfere with the continuance of the same nominal identity of each with itself or relatively to the other perpetually.

On this principle we can explain an important phenomenon, which meets us in the history of derivative calendars; though confined to the single instance of the Apis calendar of the Egyptians, or to that of the Chaldeans, or to that of the Chinese. We have already observed that this was the only form of the derivative calendar in which, from the necessity of the case, the cyclical epoch of origination must be determined and fixed by the fact of the origination itself; and therefore the Nabonassarian or Julian one corresponding to it at first must be expected to rise on what it was at first, in order to agree with it still.

Now the cyclical epoch of the Apis calendar was the 11th of Thoth; the Nabonassarian was the 9th of Thoth; the Julian, (represented by the corresponding lunar date at the time,) was the luna 3[a] dated from the conjunction. The

first of these remaining nominally ever after the same; the Nabonassarian rose with successive periods, and at the epoch of the first Apis cycle of each period, first to Thoth 10 and then to Thoth 11; the Julian, in the sense of the lunar, corresponding to it rose also first to the luna 4[a], and then to the luna 5[a].

It follows that at the epoch of the first Apis cycle in period xxvii, (which in fact was B. C. 723,) Thoth 11 cyclical was answering to Thoth 11 of Nabonassar, and both to the luna 5[a]. At the ingress of period xxviii then, and at the epoch of the first Apis cycle in that, though Thoth 12 of Nabonassar rose to an equality to Thoth 11 cyclical, Thoth 11 dropt to par with Thoth 10 cyclical; and though the former rose to the luna 6[a], the latter continued still attached to the luna 5[a]. The same process was repeated at the ingress of period xxx. Thoth 13 of Nabonassar rose to an equality to Thoth 11 cyclical; and both to the luna 7[a]: but Thoth 11 of Nabonassar dropt to Thoth 9 cyclical, and both continued equal to the luna 5[a]. And so in every other case down to the epoch of period xxxv.

Now we know that, from B. C. 728 downwards, the Apis epoch in Egypt was always attached to the luna 5[a] from the change=luna 4[a] *ex phasi:* and the explanation which we have just given assigns the reason of that peculiarity, and shews us in what necessity and on what relation of Nabonassarian or of Julian time to cyclical, from period xxviii downwards, it was founded. The Nabonassarian Thoth 11 having been brought to par with the cyclical Thoth 11 at the epoch of that period, and with it the luna 5[a]; Nabonassarian time, and Julian in the sense of lunar, in terms of cyclical from this time forward could never cease to be reckoned from Thoth 11 of the former, and from the luna 5[a] of the latter; each equal to some corresponding cyclical term at the ingress of subsequent periods, and at the epoch of the first Apis cycle of the period; though of course to a different one in each instance, and not the same; at least until the ingress of period xxxv.

This we say is the real explanation of a phenomenon, which is both matter of fact and curious and interesting in itself, and very important on account of the consequences

attached to it, and yet at first sight appears to be inconsistent with other facts; viz. that the epoch of the Apis cycle in lunar time should have gone on rising from the xxvth period to the xxviith, and that from the luna 3ª to the luna 5ª, and yet at the epoch of that period, when it had now attained to the luna 5ª, that it should have stopped there; should have been arrested at that point, and have risen no higher, (at least from the same cause as before,) but have continued nominally attached to the luna 5ª ever after *.

* The equable standard of annual time being always the same thing in itself, i. e. always consisting of 365 days; and having always been reckoned in one way from the first, viz. from the 1st of Thoth; it may be laid down as an incontrovertible proposition that no type of equable annual time could possibly be perfect of its kind, which did not begin and end perpetually on the 1st of Thoth. And this is one reason among others why the cyclical type of time of this kind is and must be the standard of reference for the Nabonassarian perpetually; because equable time in the former was always reckoned from the 1st of Thoth; in the latter, as the same with the former, it was not so reckoned nor could be from the first.

It follows that the Nabonassarian type of this reckoning, which may be conceived to have existed *de facto* from the first, could never be considered to have attained its natural form, and to have become as perfect of its kind as the cyclical; until the first day in the former reckoning from the first was coinciding with the first in the latter from the first also. And this coincidence took effect first at the ingress of period xxvii.

From the ingress of this period consequently the Nabonassarian type of equable annual time, dated from the 1st of Thoth, being identical with the cyclical, dated from the 1st of Thoth also; the former was as complete of its kind as the latter. And true equable time, brought down from the first, according to one and the same law, the law of such time itself, at this moment was represented as perfectly by one as by the other. There can be no question about this, during the decursus of period xxvii. The question is, what would begin to be the case at the expiration of that period, and at the ingress of the next?

It is manifest that the cyclical type continuing identical with itself all along, and being reckoned in the same manner perpetually, it must go on after the expiration of period xxvii just as it had done until then. It must continue to be reckoned from Thoth 1 in its own style at the ingress of period xxviii, as much as at that of period xxvii. But if Thoth 1 in this style at the ingress of period xxvii was coinciding with Thoth 1 in the Nabonassarian, there can be no question that Thoth 1 in the equable cyclical style at the ingress of period xxviii must coincide with Thoth 2 in the equable Nabonassarian: and, for the same reason, that Thoth 1 in the latter must coincide with Epagomene 5 in the former. Consequently, that cyclical equable time, carried on in terms of that of Nabonassar at the ingress of period xxviii, must be carried on by Thoth 2; and equable Na-

These various changes in the relation of the cyclical and of the Nabonassarian types of equable annual time one to the other, from the ingress of period xxvii down to that of period xxxv, which we have thus been endeavouring to explain, cannot be better illustrated or rendered intelligible than by means of a general table embodying them all, which

SECTION II.—*Synopsis of the types of origination and of the types of fix… equable annual time from period xxvii B.C.*

				TYPE I.				TYPE II.				TYPE III.				TYPE IV.		
Period	B.C.	Æra Cyclica	Æra of Nab.	A	AA	Mid-night	Feria	B	BB	Mid-night	Feria	C	CC	Mid-night	Feria	D	DD	M… ni…
xxvii	728	3279	20	Thoth 1	Thoth 1	Feb. 21	3											
xxviii	672	3335	76	1	Epag. 5	Feb. 7	2	Thoth 2	Thoth 1	Feb. 8	3							
xxix	532	3475	216	1	4	Jan. 3	1	2	Epag. 5	Jan. 4	2	Thoth 3	Thoth 1	Jan. 5	3			
xxx	420	3588	329	1	3	Dec. 6	1	2	4	Dec. 7	2	3	Epag. 5	Dec. 8	3	Thoth 4	Thoth 1	De
xxxi	280	3728	469	1	2	Nov. 1	7	2	3	Nov. 2	1	3	4	Nov. 3	2	4	Epag. 5	No
xxxii	140	3868	609	1	1	Sept. 27	6	2	2	Sept. 28	7	3	3	Sept. 29	1	4	4	Sep
xxxiii	28	3980	721	1	Mes. 30	Aug. 30	5	2	1	Aug. 31	6	3	2	Sept. 1	7	4	3	Sep
	A.D.																	
xxxiv	113	4120	861	1	29	July 26	4	2	Mes. 30	July 27	5	3	1	July 28	6	4	2	Jul
xxxv	225	4232	973	1	28	June 28	3	2	29	June 29	4	3	Mes. 30	June 30	5	4	1	Jul

bonassarian under the same circumstances, carried on in terms of cyclical, must be so by Epagomene 5. Now equable time running on from Epagomene 5 to Thoth 1, that is, from the last day of one equable year to the first of the next, is not in the proper order and style of such time; but running on from Thoth 1 to Thoth 2 it is. This latter from the ingress of period xxvii was the common style of both these types of the same kind of time. From the ingress of the xxviiith, and thenceforwards, it begins to be that of the Nabonassarian type, not of the cyclical. And this is the true reason why, after period xxvii, the type of continuation of the equable succession of annual time, which began to have two styles in common at the ingress of that period first, should be borrowed from the Nabonassarian, not from the cyclical; both in reality being all along the same, and the difference between them being only nominal, but the actual form and decursus of a common succession after period xxvii being always the proper equable one in the Nabonassarian, even as constantly referred to the cyclical, and as constantly equated to the cyclical, from that time forward as much as before; but not so in the cyclical, even as constantly equated to the Nabonassarian.

Nor is it implied hereby that this Nabonassarian term of Thoth 1, by thus giving the law to the reckoning of equable time after the ingress of period xxviii, is rendered independent of the cyclical type of equable time

we have purposely reserved for the last. We entitle this Table, " A synopsis of the types of origination and of the types of fixation of the Nabonassarian in terms of the cyclical reckoning of equable annual time, from period xxvii to period xxxv."

e Nabonassarian in terms of the cyclical reckoning of
riod xxxv A. D. 225.

TYPE V.			TYPE VI.				TYPE VII.				TYPE VIII.			
EE	Mid-night	Feria	F	FF	Mid-night	Feria	G	GG	Mid-night	Feria	H	HH	Mid-nighe	Feria
Thoth 1	Nov. 5	4												
Epag. 5	Oct. 1	3	Thoth 6	Thoth 1	Oct. 2	4								
4	Sept. 3	2	6	Epag. 5	Sept. 4	3	Thoth 7	Thoth 1	Sept. 5	4				
3	Jul. 30	1	6	4	Jul. 31	2	7	Epag. 5	Aug. 1	3	Thoth 8	Thoth 1	Aug. 2	4
2	Jul. 2	7	6	3	Jul. 3	1	7	4	Jul. 4	2	8	Epag. 5	Jul. 5	3

any more than before; much less superior to it. On the contrary, it is still the same Nabonassarian exponent of the same cyclical idea at bottom; nominally indeed the same with itself, but really different in successive periods from the xxviiith to the xxxvth, when only it ceases to differ any longer as before; a difference attested and proved all along by the difference of the cyclical term to which it is found to be assimilated at the ingress of different periods. The same may be said of the Julian term corresponding to this Nabonassarian one from period to period. This too is nominally the same, but really different all along, down to A. D. 225; as is proved by its corresponding to a different cyclical term at the ingress of different periods, and by its occupying a different feria in the order of the hebdomadal cycle at the same points of time too.

The substance of what we have said amounts to *this*: That, from period xxviii down to period xxxv, cyclical equable time, in terms of Nabonassarian, must be reckoned first from Thoth 2, then from Thoth 3, and so on, down to Thoth 9; beyond which it will not be found to advance in the style of the type of Nabonassar. Consequently that the type of continuation of equable time, after the end of period xxvii, in the proper style of such time perpetually, that is, as dated from Thoth 1 continually, must be supplied by the type of Nabonassar.

Section III.—*Explanations.*

The above synopsis does not require much explanation.

It will be observed that there are eight of these types of origination, one for each period between period xxvii inclusive and period xxxv exclusive; and that there are eight types of fixation corresponding to them. We mark the first of the former by A, the second by B, the third by C, and so on, down to H: and the first of the latter, corresponding to the first of the former, by AA, the second by BB, and so on down to HH.

In each of these instances, the first letter in these pairs of letters, A and AA, B and BB, and so on, denotes the Nabonassarian type of origination at the ingress of the period; the other the cyclical corresponding to it at the same point of time. The relation between the epochs of these successive types in each instance at first is that of the proper Nabonassarian term to the proper corresponding cyclical one at such times; and *vice versa:* the relation between them at last, (that is, at the ingress of period xxxv,) is the same in general still; that of the proper Nabonassarian term at this point of time also to the proper cyclical one; and *vice versa.* We call the Nabonassarian term in the first of these instances the epoch of origination, and in the second the epoch of fixation: though both are virtually borrowed by the Nabonassarian type from the cyclical; the last as much as the first.

But we suppose this proper Nabonassarian term of origination at the beginning of each period, in its proper state of relation to the correlative term at that point of time, to be thenceforward fixed, and nominally the same in terms down to the ingress of period xxxv: answering only to a different cyclical term at the ingress of different periods. This Nabonassarian term at the ingress of period xxvii, that is, in type i, is Thoth 1, answering to Thoth 1 cyclical, at that time, also; but at the beginning of period xxviii it is Thoth 1 of Nab. answering to Epagomene 5 cyclical; and so on, one number in the cyclical style lower for every period, down to period xxxv, when it is Thoth 1 of Nab. corresponding to Mesore 28 cyclical. In the next type, which enters along with period xxviii, it is Thoth 2 of Nab. corresponding to Thoth 1 cy-

clical; which at the beginning of the next period becomes Thoth 2 as before corresponding to Epagomene 5 cyclical; and so on down to the ingress of period xxxv, when this type too enters in the form of Thoth 2 of Nabonassar as before, but corresponding now to Mesore 29 cyclical. And so in every other instance: the Nabonassarian epoch of the type at the beginning of successive periods rising by unity in its own style on that of the type last before it; and the cyclical remaining nominally the same, but corresponding in successive types to the next highest Nabonassarian term.

The relation of these terms to each other at the time of the origination of the type we call the epoch of origination; and their relation to each other at the ingress of period xxxv we call the epoch of fixation: since whatsoever it is at that time it becomes thenceforward fixed and invariable. It is evident too that this fixed Nabonassarian type at last is obtained from the cyclical previously, at the ingress of successive periods, by one and the same rule and according to one and the same analogy throughout: and that *mutatis mutandis* there is no difference between a preceding one and the next to it. All are substantially one and the same, the first and the last as much as the first and the second; and *vice versa.* We have only to run the eye along the two corresponding top lines of the first of these types in sequence to see that Thoth 1 Nab., Epag. 5 cyclical, Feb. 7 Julian, and the feria 2, in the first are just the same in proportion as Thoth 2 Nab., Thoth 1 cyclical, Feb. 8 Julian, and the feria 3, in the second: and so on down to the last, or the ingress of period xxxv; when we have Thoth 1 of Nab., Mesore 28 cyc., June 28 and the feria 3, in type i; Thoth 2 of Nab., Mesore 29 cyc., June 29 and the feria 4, in type ii; Thoth 3 of Nab., Mesore 30 cyc., June 30 and the feria 5, in type iii; and so on: all relatively if not absolutely the same.

It follows that, if the Nabonassarian succession of equable time in its proper relation to cyclical is truly represented in any of these types, it is equally so in the rest: and at the ingress of period xxxv we perceive that, whatsoever the relation of origination in each of these instances might have been at first, it issues out in a common form of fixation at last, virtually the same in all; which in the proper style of the

equable reckoning in both types is the relation of Thoth 9 of Nabonassar to Thoth 1 cyclical, or *vice versa*. And we have already explained that this being the relation existing *de facto* between the two types at this particular point of time, when the actual Julian year and virtually the actual Gregorian also both came simultaneously into existence; it was fixed by that coincidence, and must ever after continue the same.

SECTION IV.—*On the confirmation of the above scheme of types of origination and of types of fixation, by the testimony of derivative calendars.*

The practical use and effect of the above representation is *this*: That in these different types of origination, and in these different types of fixation corresponding to them, we have a digest or synopsis of all secondary forms of the primitive calendar whatsoever, which could possibly have taken their rise from it between period xxvii B. C. 728 and period xxxv A. D. 225; or between period xxxv A. D. 225 and the present day: and if we possess also a similar pandect of all derivative forms of the same primitive original, which could possibly have taken their rise from it between period i and period xxvii, we shall have a complete digest, within the smallest possible limits, and yet on the largest and most comprehensive scale which is possible too, of all the secondary or derivative forms of the primitive calendar which could have taken their rise from it, under any circumstances, between the beginning of things and the present day. And we have already shewn that there *is* a common form or type into which, in coming down from the epoch of their origination, whatsoever that was, to the ingress of period xxvii, they must all pass at the ingress of this period itself; which type may consequently be said at that moment to sum up or comprehend them all, and virtually to make one of them all.

We arrive then at this conclusion at last, which is both interesting and important in the highest degree; and by a process of reasoning the various steps of which it appears to us cannot be disputed; That indefinitely numerous as the possible forms and varieties of derivative calendars may appear capable of being in the abstract, they must be reducible

in reality under a very few general and comprehensive types; all, which are older than period xxvii, under *one* type of that description, and all, which are later, under *seven* more at the utmost. Nor does this conclusion rest upon *a priori* reasonings merely; much less on our own assertion. It is confirmed by the matter of fact, and by the testimony of calendars themselves. Nor can we make an end of this part of our subject in a manner more calculated to illustrate and verify the conclusion at which we have arrived, than by an actual appeal to these calendars and to their testimony.

We have already enumerated all those, both older than period xxvii and later also, which it has pleased God to bring to light through our researches: and all that we have to do, in order to the practical proof of the truth of our assertions, is simply to shew, by means of actual instances of both descriptions, in what manner each of the former admits of being resolved into a general type or form at last; and each of the latter, of being digested under seven such types, and no more. It will thus appear that there can be no calendar, older than period xxvii, even though not yet discovered, which, if it should ever come to light, must not be reducible under that one type; nor any later than the same period, which must not be reducible under one or other of those seven types.

Only, as the calendars anterior to period xxvii, which even we ourselves have been enabled to discover, are much too numerous to be all exhibited in detail when they were passing and as they were passing successively through the same process, which issued out in this common generic form at last; it will suffice to produce two or three cases of the kind, as specimens of the rest: which we shall take from the Sothiacal calendar of the Egyptians, from the Phrygian correction of Midas, from the Apis cycle of the Egyptians, and from the xxvth type in our list, the original of the modern Julian calendar of Syria.

Equation of the epochs of origination both in the cyclical and in the Nabonassarian type of the equable notation of noctidiurnal and annual time, at the ingress of period xxvii of the Fasti, in all calendars derived from the primitive anterior to that period; and the steps of the process by which it was effected: illustrated by four examples.

Example I.

Sothiacal correction of the Egyptians. Julian. In periods of 120 *years, or one cyclico-Julian period.*

B.C.	Æra Cyc.	Period.	Year.	A	AA	B	C	CC
1350	2657	xxii	23	Thoth 1	Epagomene 1	July 22	Thoth 1	July 22
1230	2777	xxiii	31	Epagomene 5	Epagomene 1	June 22	Thoth 30	July 22
1110	2897	xxiv	11	Epagomene 4	Epagomene 1	May 23	Phaophi 29	July 22
990	3017	xxiv	131	Epagomene 4	Epagomene 1	Apr. 23	Athyr 29	July 22
870	3137	xxv	111	Epagomene 3	Epagomene 1	Mar. 24	Chœac 28	July 22
750	3257	xxvi	119	Epagomene 2	Epagomene 1	Feb. 22	Tybi 27	July 22
728	3279	xxvii	1	Epagomene 1	Epagomene 1	Feb. 16	Mecheir 1	July 21

Example II.

Phrygian correction of Midas. Cyclico-Julian. In periods of 120 *years, or one cyclico-Julian period.*

B. C.	Æra Cyc.	Period.	Year.	A	AA	B	C	CC
1301	2705	xxii	72	Pachon 26	Pachon 21	Mar. 31	Pachon 26	Mar. 31
1181	2825	xxiii	80	Pachon 25	Pachon 21	Mar. 1	Païni 25	Mar. 31
1061	2945	xxiv	60	Pachon 24	Pachon 21	Jan. 31	Epiphi 24	Mar. 31
941	3065	xxv	40	Pachon 23	Pachon 21	Jan. 1	Mesore 23	Mar. 31
821	3186	xxvi	48	Pachon 22	Pachon 21	Dec. 2	Thoth 17	Mar. 31
728	3279	xxvii	1	Pachon 21	Pachon 21	Nov. 9	Phaophi 9	Mar. 31

Example III.

Apis calendar of the Egyptians. Lunæsolar. In periods of 125 *cylical years, or five Apis cycles.*

B.C.	Æra Cyc.	Period.	Year.		A	AA	B	B
973	3034	xxv	8	Cycle i. 1	Thoth 11	Thoth 9	Luna 3a	May 1
848	3159	xxvi	21	Cycle vi. 1	Thoth 11	Thoth 10	Luna 4a	Apr. 1
723	3284	xxvii	6	Cycle xi. 1	Thoth 11	Thoth 11	Luna 5a	Mar. 2

Example IV.

Syrian correction. Cyclico-Julian. In periods of 120 *years.*

B.C.	Æra Cyc.	Period.	Year.	A	AA	B	C	CC
962	3045	xxv	19	Athyr 17	Athyr 15	July 4	Athyr 17	July 4
842	3165	xxvi	27	Athyr 16	Athyr 15	June 4	Chœac 16	July 4
728	3279	xxvii	1	Athyr 15	Athyr 15	May 6	Tybi 14	July 4

EXPLANATIONS.

A. = Cyclical date of origination at first; and at the ingress of subsequent periods, or just before, the cyclical term corresponding to the Nabonassarian date of origination.

AA. = Nabonassarian date of origination, which is fixed in terms ever after also.

B. = Julian date of A and AA, at the epoch of origination, and at the ingress of each period, or just before, subsequently.

C. = Cyclical date corresponding to the Julian date of origination at first, and at the ingress of each subsequent period.

CC. = Julian date of origination, supposed to be the same in terms ever after.

It appears from these schemes that, at the ingress of period xxvii B. C. 728, A in each instance is the same as AA. At this moment consequently the two styles, the cyclical and the Nabonassarian, agree in terms. The same equable term in either expresses the same Julian and the same hebdomadal.

From this time forward then, (i. e. after the expiration of period xxvii, and with the ingress of period xxviii,) down to period xxxv A. D. 225, in continuing both successions as before, we borrow the equable exponent of the Julian term at the beginning of each period from the Nabonassarian type, the feria proper to it from the cyclical.

If the calendar has a fixed Julian term of origination at all times, like the Sothiacal, or at stated times, like the Phrygian, and the succession of equable along with Julian and hebdomadal time proceeds in periods of 120 years perpetually; then the Nabonassarian term which answered to this Julian one at the ingress of period xxvii will be found to rise 30 days on itself perpetually in the order of the equable notation.

Thus B. C. 728, at the ingress of period xxvii, the Nabonassarian term corresponding to July 21, (the stated epoch of the Sothiacal period at this time in every year of its proper cycle of leap year but the first,) is found to be Mecheir 1.

Seven periods of 120 years, or 840 years, after this, A. D. 113, it is found to be Epagomene 1; as may be seen from our general tables. Twenty years after, A. D. 133, as our tables

also show, it is found to be Thoth 1. But the proper Sothiacal date at this time and in this year of the cycle was not July 21, but July 20. The true date consequently of the second Sothiacal period was not A. D. 133, but three years later, A. D. 136, when Thoth 1 first began to fall on July 20; or at the latest, A. D. 139, when it was still falling on the same day. These distinctions however will be better understood hereafter.

Types of origination, types of fixation, and types of continuation, in the Nabonassarian and in the cyclical types of equable annual time, respectively, from period xxvii B. C. 728 to period xxxv A.D. 225, and thenceforwards.

I. Period xxvii B. C. 728. Type of origination, Nabonassarian Thoth 1 = Cyclical Thoth 1.
Type of fixation, Nabon. Thoth 1 = Cyclical Mesore 28.
* Type of continuation, the Nabonassarian Thoth.

	Nab.	Cyc.	Midnight	B. C.
i. All calendars anterior to period xxvii	Thoth 1	Thoth 1	....	728
ii. Roman correction of Numa Pompilius	Thoth 1	Thoth 1	Feb. 17	712
iii. Persian correction of Gjemschid	Phaophi 6	Phaophi 6	Mar. 22	702
iv. Alexandrine correction	Thoth 1	Mesore 30	Aug. 30	26

II. Period xxviii B. C. 672. Type of origination, .. Nabon. Thoth 2 = Cyclical Thoth 1.
Type of fixation, ... Nabon. Thoth 2 = Cyclical Mesore 29.
Type of continuation, Nabon. Thoth 2.

	Nab.	Cyc.	Midnight	B. C.
i. Japanese enneakaidekaëteris	Thoth 16	Thoth 15	Feb. 19	660
ii. Chinese enneakaidekaëteris	Thoth 13	Thoth 12	Feb. 16	657
iii. Hellenic octaëteris, type i	Thoth 2	Thoth 1	Jan. 19	592
iv. Cyclico-Julian Arabian correction, type ii. ..	Athyr 7	Athyr 6	Mar. 23	582
v. Hellenic octaëteris, type ii	Thoth 2	Thoth 1	Jan. 13	567
vi. Cyclico-Julian correction of Emesa, &c. .. .	Athyr 18	Athyr 17	Mar. 27	557
vii. Hellenic octaëteris, type iii	Thoth 2	Thoth 1	Jan. 7	542

III. Period xxix B. C. 532. Type of origination, .. Nabon. Thoth 3 = Cyclical Thoth 1.
Type of fixation, ... Nabon. Thoth 3 = Cyclical Mesore 30.
Type of continuation, Nabon. Thoth 3.

	Nab.	Cyc.	Midnight	B. C.
i. Punic calendar	Thoth 3	Thoth 1	Jan. 5	532
ii. Hellenic octaëteris, type iv	Thoth 3	Thoth 1	Jan. 2	517
iii. Druidical triacontaëteris	Thoth 3	Thoth 1	Jan. 1	514
iv. Hellenic octaëteris, type v.	Thoth 3	Thoth 1	Dec. 26	493
v. Hellenic octaëteris, type vi	Thoth 3	Thoth 1	Dec. 20	468
vi. Armenian and Cappadocian Persico-cyclical correction	Chœac 8	Chœac 6	Mar. 24	462

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* By the type of origination is meant the form in which the Nabonassarian or the cyclical year enters our tables at the ingress of a particular period from period xxvii to period xxxv. By the type of fixation is meant the form in which each enters the tables at the ingress of period xxxv. By the type of continuation is to be understood the form in which the same equable reckoning is continued in period xxxv, and ever after, as before.

This may be either in the Nabonassarian, dated from the epoch of fixation under which it enters period xxxv, or in the cyclical, corresponding to the Nabonassarian at the same point of time. There is a standing difference between the two types at this point of time, as our tables shew; which in every instance is eight terms alike between the cyclical date of fixation and the Nabonassarian: but distinct from this there is no difference between the two forms of equable time after period xxxv but what there is also between the two forms of Julian, the Julian proper and the Gregorian. The Nabonassarian type of equable annual time is most proper to accompany the proper Julian type of annual also, from period xxxv downwards; the cyclical the Gregorian. In the case too of the Nabonassarian style of equable time perpetually, the type of origination, the type of fixation, and the type of continuation, nominally in each instance are the same; though there is a real difference between them all along; and nothing is actually the same but the type of fixation at the ingress of period xxxv, and the corresponding type of continuation.

IV. Period xxx B.C. 420. Type of origination, .. Nabon. Thoth 4 = Cyclical Thoth 1.
Type of fixation, ... Nabon. Thoth 4 = Cyclical Epag. 1.
Type of continuation, Nabon. Thoth 4.

	Nab.	Cyc.	Midnight	B. C.
i. Northern octaëteris, type i	Phaophi 4	Phaophi 1	Dec. 25	365
ii. Calendar of Seleucia on the Tigris	Paüni 4	Paüni 1	Aug. 8	306
iii. Cyclico-Julian Suevic correction	Athyr 20	Athyr 17	Jan. 24	297

V. Period xxxi B. C. 280. Type of origination, .. Nabon. Thoth 5 = Cyclical Thoth 1.
Type of fixation, ... Nabon. Thoth 5 = Cyclical Epag. 2.
Type of continuation, Nabon. Thoth 5.

	Nab.	Cyc.	Midnight	B. C.
i. Northern octaëteris, type ii	Thoth 5	Thoth 1	Oct. 26	240
ii. Norwegian correction	Athyr 21	Athyr 17	Jan. 9	234
iii. Bithynian correction	Athyr 21	Athyr 17	Dec. 24	170

VI. Period xxxii B.C. 140. Type of origination, .. Nabon. Thoth 6 = Cyclical Thoth 1.
Type of fixation, ... Nabon. Thoth 6 = Cyclical Epag. 3.
Type of continuation, Nabon. Thoth 6.

	Nab.	Cyc.	Midnight	B. C.
i. Calendar of Vacca in Numidia	Thoth 6	Thoth 1	Oct. 2	140
ii. Northern octaëteris, type iii	Thoth 6	Thoth 1	Sept. 16	74

VII. Period xxxiii B.C. 28. Type of origination, .. Nabon. Thoth 7 = Cyclical Thoth 1.
Type of fixation, ... Nabon. Thoth 7 = Cyclical Epag. 4.
Type of continuation, Nabon. Thoth 7.

Desiderantur.

VIII. Period xxxiv A.D. 113. Type of origination, Nabon. Thoth 8 = Cyclical Thoth 1: type of fixation, Nabon. Thoth 8 = Cyclical Epag. 5: type of continuation, Nabon. Thoth 8.

	Nab.	Cyc.	Midnight	A. D.
i. Yucatan calendar	Thoth 8	Thoth 1	July 14	190

APPENDIX TO DISSERTATION VIII.

CHAPTER I.

On the calendars in use at present, and on the steps by which they have been derived from the primitive.

SECTION I.—*Statement of the object proposed in this summary.*

BEFORE we take our leave of the subject of derivative calendars, primary and secondary, for the present, we propose to bring the whole of our argument to a point which may bear on the actual state of the case; connecting the calendars still in use with the simple and primary source of the being of all.

Our readers, we hope, will excuse us, if we appear to recur to this subject too frequently, or to dwell upon it too exclusively. It is an arduous task to procure a favourable reception for new and unheard of discoveries; especially for one like this, which has so much of the appearance of extravagance or paradox, and is opposed by the most inveterate prepossessions and prejudices; viz. that all the modes of the artificial reckoning of time, which have ever been contrived or have ever existed in the world, have had a common origin in something distinct from them all, yet similarly related to them all. The shortest and most effectual means of convincing even the most sceptical of this truth would seem to be to make it appear, not only to their reason but even to their senses, that the fact is as we affirm it to be; that go where they may, and inquire where they may, they will still find mankind using the same primitive calendar in one form or other; they will every where discover the substance and outline of the same original type of civil time: which after having passed through certain intermediate states of existence, (what these may have been, or what length of time each may have occupied, being matter of accident, and indifferent to the result at last,) has settled down in all these instances into that form and into that state in which and under which they may be conscious to themselves that they actually see it existing at the present day.

If this can be made out satisfactorily in every case of the kind; if the various links of dependence and continuity which join the two ends of the same chain in so many instances can be clearly pointed out and established; there is no longer any room for doubt on rational grounds: though it is still possible that obstinate prejudice may refuse to be convinced even by such evidence as this. But no candid mind, no one possessed of common sense, will think of clinging to prejudices, founded at bottom on ignorance and on the absence of all proper and previous inquiry, however deeply seated they may be, in opposition to such plain and irrefragable proofs of their unreasonableness and of their falsehood, as these.

The particulars indeed of these proofs, in each of the cases which supply them, must be reserved for a future time and place. The sum and substance of the whole may be briefly submitted to the reader even at present; and it will form only an appropriate conclusion of all which we have hitherto been saying on this subject.

SECTION II.—*The number of calendars which once existed much greater than that of those which exist at present.*

The number of calendars in actual existence at present, as we

have already observed[a], bears no comparison to that of those which once existed. But neither does the number of cities or of communities, (of integral divisions of mankind, whether greater or less in themselves, yet each of them discriminated by a name and a local habitation of its own,) which once existed and once carried on the affairs of public and private life independently of one another, bear any comparison to that which now exists. There was a time when every such city and community had a coinage and currency of its own: and the cabinets of the curious are full of the proofs of that fact. It is not more extraordinary that each should have had a calendar of its own; even the smallest and most insignificant among them.

These calendars have ceased to exist: but so have the cities and nations (at least in that state of distinctness and independence to which we allude) which made use of them. The entire fabric of social existence has been taken to pieces and reconstructed by the lapse of time, and by the change of circumstances. Distinctions which once existed have been totally obliterated. Characters and lines of discrimination, before broadly and legibly imprest on the features of the world, have been effaced, or have run into one. The appearance of external nature has no where continued the same; much less that of social and domestic life. Time has removed the ancient landmarks: and Terminus himself, who would not yield up possession to the Capitoline majesty of old, has been forced to give way before the onward march of change.

The calendars then which once existed, in the majority of such instances, are matters of history, not objects of sense or subjects of observation at present. But many of them are recoverable, and are still capable of being represented as they once existed; and all which are so recoverable, and which can be so restored, and as far as they are recovered and are restored, bear the same testimony to the fact of their common original. The political ascendency of Rome and the spiritual ascendency of Christianity, under the control and direction of a superintending Providence, appear to have done most to abolish the preexisting distinctions of civil time, and to assimilate every form of the calendar to the Julian; and the superior usefulness of the Julian calendar, for every purpose which the calendar is wanted to serve, has justly retained it, (at least in Europe and among Christians every where,) in possession of the influence which it thus acquired over every other. Yet notwithstanding this fact the calendars different from the Julian, which still exist,

[a] Supra, Diss. vii. ch. i. sect. iii. p. 548.

are sufficiently numerous, along with the Julian itself, to furnish the basis of a general induction; That if each and all of so many existing forms and varieties of the same thing, which is every where known by the name of the calendar, are still capable of being traced up to one and the same original source and primary state of their being; there could have been nothing of the same kind formerly in existence, which must not have been derived from the same source too.

Section III.—i. *The modern Julian calendar.*

We will begin our enumeration of cases of this kind with the Julian Calendar; the calendar of civilization, of refinement, of learning and science every where; and what is more, the calendar of Christianity, the calendar consecrated to the service of the Christian dispensation from the first; and with a special prospective view to its use and subserviency in that respect, (if we are not greatly mistaken,) the calendar recognised, approved, and sanctioned in the most significant manner by the Author and contriver as well as the controller and regulator of time itself, long before it had yet an actual existence.

The steps of derivation in this instance are clear and well ascertained. *We* derive the Julian calendar at present in use from the Roman correction of Cæsar. The Roman correction of Cæsar was derived from the irregular form of the Decemviral correction of the calendar of Numa Pompilius. The calendar of Numa Pompilius was directly derived from the primitive. The pedigree therefore (if we may so denominate it) of this most important of modern calendars is easily drawn out; and none can boast of a more lineal descent from the common stock.

Derivation of the modern Julian calendar from the primitive.

i. Primitive calendar of ancient Italy.
Thoth 1, Æra cyc. 1.
April 25, feria prima, at midnight, A. M. 1, B. C. 4004.

ii. Pompilian correction of the primitive calendar.
Thoth 1, Æra cyc. 3295.
Feb. 17, A. M. 3293, B C. 712.
Kalendæ Januariæ, U. C. 39=42.

iii. Decemviral correction of the Pompilian calendar.
Kalendæ Januariæ, U. C. 303=306.
December 29, B. C. 449.

iv. Kalendarium Romanum vagum.
Irregular form of the Decemviral correction.
Kalendæ Januariæ, U. C. 543=546.
December 29, B. C. 209.

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v. Roman correction of the Dictator Cæsar.
Kalendæ Januariæ, U. C. 706=709.
December 30, B. C. 46.

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vi. Modern Julian calendar.
Kalendæ Januariæ, U. C. 975=978.
January 1, A. D. 225.

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vii. Gregorian correction of the modern Julian calendar.
December 22, A. D. 1582, old style.
January 1, A. D. 1583, new style.

ii. *The calendar of Hej'ra.*

The next modern calendar, the derivation of which from the primitive we propose to exhibit, is the lunar calendar of the Arabians, commonly called the calendar of Hej'ra, that is, "The Flight." It is the calendar of Mohammedanism, as contradistinguished to Christianity; and, next to the Julian or to the Gregorian, it has probably at present the most extensive circulation of any one calendar in use among mankind.

This calendar was connected in its origin with the primitive in two ways; one indirectly, through the calendar of Medina, the other directly, through that of Mecca; the former a calendar derived from the cyclico-Julian correction of Medina, the latter one derived directly from the equable calendar of Mecca; the former attached to Ramadân 1, March 22, the latter to Dhu'lkaadah 1, May 20, but both in the same year, A. D. 383.

This, as we have already observed, is the true and proper epoch of the Arabian lunar calendar, older than that of Hej'ra; older, in fact, than Islamism itself: the calendar of the *times of ignorance*, as the Arabians denominate the period anterior to the appearance of their prophet. And it was strictly *cyclical;* regulated by the Metonic cycle of 19 years, and by the Callippic of 76; subject however to a peculiar rule and qualification of its own.

In A. D. 630, by command of Mohammed himself, and for a reason which we hope to explain in due time, the regular cycle and regular administration of this calendar were discarded. And from that time

forward the calendar became vague or moveable; that is, it began to follow the natural course of the moon, and to reckon lunar time solely from the natural appearance, or phasis, of the moon; though it still consisted of 12 months as much as before. And as it happened that Moharram was the month next in course when the rule of the calendar was thus changed; on that account almost as matter of course, as well as for other reasons which may be more fully explained hereafter, Moharram became thenceforward the first month of the calendar, though before it was the third. And, in this first instance of all, it was reckoned from July 16, the date of the phasis in the month of July A. D. 630; and, according to the rule of the calendar previously in use, the second of the cyclical month.

The calendar of Hej'ra, properly so called, is an artificial lunar reckoning, purposely contrived by the astronomers of the Khalif Almamoun, 210 years in the æra of Hej'ra later than the epoch of the æra: and for all civil and domestic purposes, in contradistinction to ecclesiastical or religious, it was intentionally substituted for it. In point of original however, it is not to be considered distinct even from this: and though published, as we apprehend, in Hej'ra 211, A. D. 826, it retained the traditionary date of the epoch of this; merely carrying it back by anticipation to the historical epoch of the æra of Hej'ra itself, that of the Flight of Mahomet from Mecca to Medina, A. D. 622.

At this time also, according to the technical rule of the calendar, the first of Moharram was to be dated either from July 15 or July 16, as much as A. D. 630; the former the epoch preferred by the astronomers, the latter the popular or common one: both however reckoned or supposed to be reckoned *ex phasi*, and both from sunset; the former from sunset July 14, the latter from sunset July 15. The vulgar or popular date, July 16, was more true to the phasis at the time. According to the calendar actually in use A. D. 622, the first of Moharram would have been July 13 at midnight, or July 12 at sunset. But by virtue of its peculiar rule, it was liable to recede on the moon; and it was actually now two days in defect of the astronomical new moon itself.

We connect this calendar of Hej'ra with the primitive by a very few intermediate steps.

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i. Primitive equable calendar of Arabia.

Thoth 1, Æra cyc. 1.

April 25, at midnight, A. M. 1, B. C. 4004.

ii. Metonic or Callippic correction of Mecca.
Thoth 1, Nabon. 1131.
Dhu'lkaadah 1, May 20, A. D. 383.

iii. Natural lunar calendar of the Arabians.
Moharram 1, July 16, A. D. 630.

iv. Technical calendar of Hej'ra.
Moharram 1, Hej'ra 211.
April 12 or April 13, A. D. 826.

iii. *The Coptic calendar.*

The Coptic calendar is properly the calendar of the Christians of Egypt; but being solar or Julian it is very generally used even by the Mahommedans, especially by the learned and men of science among them.

This modern Coptic is the representative of the ancient Alexandrine. It has not varied, in any essential respect, from the standard of its prototype; not even an hair's breadth in the lapse of nearly 2000 years. The names of its months alone, in passing from mouth to mouth, have undergone some changes, amounting almost to corruptions; yet not so much but that they are easy to be recognised even in their present form; and in the style of the more learned and better informed among the Copts themselves, down to a late period, they still differed very little from their original and their genuine form.

It is more easy to connect this calendar with the primitive than any which we have yet considered.

Derivation of the Coptic calendar from the primitive.

i. Primitive equable calendar of Egypt.
Thoth 1, Æra cyclica 1.
April 25, midnight, A. M. 1, B. C. 4004.

ii. Alexandrine correction of the primitive Egyptian calendar.
Thoth 1, Nabonassar 723.
August 30, B. C. 26.

iii. Coptic calendar, 470th cycle of leap year.
August 30, A. D. 1851.

iv. *The modern Armenian calendar.*

The Armenian correction of the primitive calendar, which enters

our list of primary derivative calendars along with the Cappadocian, No. xlix, retaining the impression of the first modification of the primitive calendar agreeably to the Persian rule of Gjemschid, which had been stamped upon it at this very time B. C. 462, was yet in existence in Armenia as late as A. D. 1710; and probably it is so still.

Besides this, the Armenians have also a proper Julian calendar, designed originally for ecclesiastical or religious purposes; the administration and details of which resembled those of the Alexandrine at the time, and consequently resemble those of the Coptic at present: not those of the modern Julian calendar. This Julian correction of the vulgar Armenian calendar, (of the cyclical or Persico-cyclical alluded to above,) borrowed its epoch from that; Navasardi 1, August 12, in the leap years of the cycle, August 11 in the common years; and, as we hope to shew hereafter, in A. D. 435.

In this case also the connection of the modern with the primitive type of the calendar is clear and simple.

Derivation of the modern Armenian calendar from the primitive.

i. Primitive equable calendar of Armenia.
Thoth 1, Æra cyc. 1.
April 25, midnight, A. M. 1, B. C. 4004.

ii. Persico-cylical correction of the primitive calendar.
Chœac 8, Nab. 286=Navasardi 1.
March 24, midnight, B. C. 462.

iii. Julian correction of Armenia.
Navasardi 1, Nabonassar 1183.
August 12, A. D. 435.

v. *The modern Syrian calendar.*

The modern Syrian calendar being solar is of very extensive circulation in the east. The Arabian writers (the astronomers and the historians) for scientific or literary purposes make as much use of it as of their own calendar of Hej'ra. It is Julian both in its principles and in its details at present: and in all respects but that of the beginning of the year and of the names of the months it agrees with the modern Julian calendar.

This modern solar and Julian calendar of Syria is the direct lineal representative of the xxvth on our list; the cyclico-Julian correction of Syria in general, of the date of B. C. 962. Its history is curious and interesting almost above that of any other calendar of antiquity, except the Julian; and it belongs to a family of calendars

the importance of which in every point of view it is impossible to overrate. At present it bears date on the first of Teshrin prior; but it did so originally on the first of Tammuz, or Thammuz. This distinction is accidental, and we may add immaterial; especially as we can explain both when it was made and why.

Between this offshoot of the primitive stock and the primitive itself there is only one remove.

Derivation of the modern calendar of Syria from the primitive.

i. Primitive equable calendar of Syria.
Thoth 1, Æra cyc. 1.
April 25 at midnight A. M. 1, B. C. 4004.

ii. Cyclico-Julian correction of the primitive calendar of Syria.
Athyr 17=Tammuz 1, Æra cyc. 3045.
July 4, B. C. 962.

iii. Modern Julian calendar of Syria.
Teshrin prior 1, October 1, A. D. 473.

vi. *The modern calendar of Persia, distinct from that of Hej'ra.*

The lunar calendar of Hej'ra is received in Persia as well as among the rest of the Mahommedans every where: but, besides this, the Persians have a solar calendar of their own, of very extensive circulation not merely in Persia, but in Syria, Turkey, India, and among the Mussulmans and Hindus, as well as among the Parsees, of the latter country.

This solar calendar of the Persians is twofold; one cyclical, in the sense of revolving, that is moveable, like the primitive, the other fixed, in opposition to one of that description. The use of the former is commonly associated with that of the æra known by the name of the Æra of Yezdejerd; which enters our Fasti Catholici at the proper time as the Æra Persica. But as this æra itself is used only for scientific or literary purposes, neither is the calendar, associated with it, for any other purpose; except it be among the Parsees of Persia or of India, for the regulation of their religious services. The other form of the solar calendar in Persia is the Gelalæan; a calendar Julian in principle and administration as much as the Julian itself, though subject to a peculiar rule of its own; of which those who desire a general account at present may find it in the Introduction to our Tables[b].

This Gelalæan correction however was directly derived from the

[b] Introduction, part i. ch. iii. sect. x, note.

cyclical calendar above described; the 19th of the first month in that, the 19th of Phervardinmah, in the year of the correction, having been constituted the Nauruz or new year's day, the first of Phervardinmah, in this correction. As to the preexisting cyclical calendar; when traced back to its origin it is found to be altogether the same as the Persian correction of Gjemschid; which took its rise from the primitive calendar in B.C. 702.

The rule of this correction was strictly observed in Persia down to the epoch of the fourth cyclico-Julian period of 120 years peculiar to it, B. C. 342: and at that time, the month which succeeded to the head of the calendar, according to rule, (to the head of the popular calendar,) was this month, Phervardinmah. Twelve years after this, B. C. 330, in consequence of the death of the last of the kings of Persia, Darius Codomannus, the first Persian empire became extinct; and it is no wonder that the Gjemschid rule and Gjemschid administration of the calendar fell into abeyance also.

Be this as it may; the fact at least is certain, that Phervardinmah, having become the first month in the civil style of the calendar *secundum ordinem* B. C. 342, continued to be the first month *extra ordinem* after B. C. 222; when the next correction, according to rule, should have been administered to the calendar. Nor was it thought proper to disturb a prescription in its favour of so long a standing, or to dispossess it of its place at the head of the civil calendar, even when the Gjemschid rule was restored in A. D. 272, 600 years after it had fallen into disuse, under the third of the Sassanidæ, Hormisdas i, son and successor of Shapuah or Sapor i, and grandson of Artaxerxes i, Ardeshir Babecan, founder of the second Persian empire itself.

The pedigree of these calendars then is to be drawn out as follows;

Derivation of the calendar of Yezdejerd, and of the Gelalæan correction, from the primitive.

i. Primitive equable calendar of Persia,
Thoth 1, Æra cyc. 1.
April 25, midnight, A. M. 1, B. C. 4004.

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ii. Cyclico-Julian correction of the primitive calendar, by Gjemschid
Phaophi 6=Deymah 1, Æra cyc. 3305, Nab. 46.
March 22, B. C. 702.

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iii.

iii. Equable or cyclical form of the correction of Gjemschid.

Phervardinmah 1, Æra cyc. 3665, Nab. 406.

March 22, B. C. 342.

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iv. Gelalæan correction of the equable calendar.

Phervardinmah 19=Phervardinmah 1,

Æra Persica 448=Nab. 1827.

March 15, A. D. 1079.

vii. *The modern Æthiopic or Abyssinian calendar.*

The modern Abyssinian calendar is Julian; and it resembles the Coptic so much both in principle and in details that it might easily be taken for the same thing as the Coptic itself. But it was not derived from the Coptic; and it differs in reality even from the Coptic, in a very characteristic circumstance; which we hope to point out hereafter.

This calendar was obtained directly from the primitive: and it may be resolved into it again without any intermediate process. It is consequently one of the most important, and the most conclusive in its testimony, to the fact of the derivation of all actually existing calendars at present, from the same common original; being the most recent of such derivative calendars in general, and the least removed from the common source of all.

Derivation of the modern Abyssinian calendar from the primitive.

i. Primitive equable calendar of Abyssinia.

Thoth 1, Æra cycl. 1.

April 25, midnight, A. M. 1, B. C. 4004.

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ii. Julian correction of the primitive calendar of Abyssinia.

Thoth 1, Nabonassar 2185=Mascaram 1.

August 29, A. D. 1436.

SECTION IV.—*On the residue of modern derivative calendars in general.*

We should neither exhaust the list of modern calendars derivable from the primitive, actually in use at present, (and on a very extensive scale,) nor do justice to the argument founded on the collective testimony of all, did we omit to take into account the calendars of Hindustanee, of Siam, of Japan, of China, or Tartary respectively; all of which circulate over so wide a surface of the earth, and are daily and hourly applied to the public and private necessities of so many millions of mankind.

We have already explained in brief the first steps of the derivation of the Hindu and the Chinese among these from the primitive. The changes which they have since undergone have been only modifications of this first state of transition from the primitive. These calendars are reducible, even in their present state, under the category of secondary forms of derivation. It is easy to trace the primitive calendar through these different states of its being, down to the present day; or *vice versa* to trace the actual state of the calendar in these instances at present, through such intermediate stages, up to the original of all. With the reader's permission however we will consider sufficient to have been done for the illustration of the argument at present; and we will reserve all further and more circumstantial proofs of this kind for a future opportunity. There are notwithstanding some general observations which may very properly still be made on the particular case of calendars, which, though actually not in existence at present, were so, at no very great distance of time back.

For example, we have only to go back to the date of the capture of Constantinople by the Turks in A. D. 1453, to find the Greek calendar, the proper civil calendar of the empire of the Cæsars, still in being; and a calendar strictly Julian, only bearing date on September 1: the original derivation of which from the primitive, through the Macedo-Hellenic type of the enneakaidekaëteris, we have fully illustrated and explained already. This calendar has long been overlaid, and by this time no doubt has been totally extinguished, within the limits of its proper hereditary jurisdiction, by the Turkish calendar, or by the calendar of Hej'ra: yet down to A. D. 1453, and unquestionably too for some time more or less even after that event, it still survived. It was a living and modern testimony to its own original, as much as any thing else of the same kind contemporary with it.

A collection of solar and Julian calendars is extant; embodied in a monument of antiquity well known to the learned under the name of the Florentine Hemerologium. The sources of all these calendars are to be found either in the primitive cyclical, or in the cyclico-Julian, or in the lunar, modifications of the primitive; and we hope that in due time they will be pointed out in our Origines Kalendariæ. But what are we to say to these calendars, as exhibited in the Hemerologium? In what point of view is this collection itself to be regarded? Are the calendars in this list such as still existed, or such as had ceased to exist?

The answer to this question probably depends on that which

must be returned to two others: one, What is the date of the collection? the other, What was the object of the collection? And this latter is that which requires to be answered first. Was it the object of the collection, merely to compare calendars of different kinds together, without intending any use to be made of them? Was it a compilation of mere speculation and curiosity, or of practical use and application? a scholastic exercise, a work of the closet, a chronological abstraction? or a manual of calendar time in different styles, a text-book of dates and references?

We could not enter on these questions at present. We will observe only that there are two calendars at least in the collection, which must have had an actual existence in the time of its author, because they are in existence still; viz. the Roman or Julian, and the Alexandrine: the former of which too serves as the standard of reference for all the rest perpetually. To judge then from the analogy of these two, and from that of the Greek calendar of the date of October 1, (differing *per accidens* only from that of the date of September 1,) we must conclude that all the rest, which enter the same collection, had an actual existence as well as these. Now this being assumed as true of them all, at the time when the collection was made; then from the fact which holds good of one of the number, the Cappadocian in particular, it would be in our power to demonstrate that the date of the collection could not be earlier than A. D. 1024: from which it would follow that every calendar, which appears in this collection, must still have had an actual existence as late as A. D. 1024.

To say nothing more at present however of the calendars of classical antiquity; those of Spanish America do certainly lay claim to admission among the number of such as had an actual existence up to a very recent point of time; though the change of circumstances, both political, religious, and moral, entailed by the conquest, and the natural ascendency of the Julian calendar, which the Spaniards brought with them and established in the same countries, would conspire to supersede them by degrees, and finally to extinguish them. And besides this, it happened by a remarkable coincidence that many of these native calendars, older than the conquest, were Julian in principle already: and differed so little from the Julian even in their details, that a very slight change in their proper rule was sufficient to assimilate them to the Julian at once. The Peruvian calendar seems to have been Julian *de facto* at the very time; bearing date on the first of January. The Aztec or Mexican in the rectified years of the cycle of 52 years bore date on December 31.

So did the Tezcucan, in the first year of its proper cycle, though not in the first of that of the Mexican calendar. The ancient Toltec bore date on March 1: and even those calendars which differed from this in other respects, yet had adopted the same rule of administration in general, appear to have been so determined by circumstances, that at the time of the conquest the normal state of all was such as to coincide with the months of December and January, more or less completely; and the head of the calendar in every instance was very near the end of December or the beginning of January.

Such calendars then might be in full life and vigour up to the very day when the Spaniards set foot on the soil of Mexico, A. D. 1517; and yet very soon after that event, and after the surprising revolution of all things which followed so quickly upon it, have yielded one after another to the ascendency of the Julian calendar; and at last have become totally absorbed in that. And yet this is a point which requires further investigation; and which would probably reward the pains of the strictest and closest investigation by the number of interesting discoveries which it might bring to light. We are credibly informed that the Araucan calendar, the principle of which agreed with that of the Peruvian in general, was still maintaining its ground in the mountain fastnesses of Chili, attached to its original epoch of December 11, as late as the 18th century. And in Mr. Stevens' "Personal Incidents of Travel in Yucatan," there is an interesting memoir, from the pen of a learned Spanish ecclesiastic, on the calendar of Yucatan; which according to this account was still in being and still regulated by its ancient rule, as late as A. D. 1841.

These various forms of the civil calendar in Spanish America were derived, at different times and in different ways, from the very same original as any of those of Europe, or Asia, or Africa; the primitive calendar of all mankind: and that fact must be demonstrative that this calendar must have been the hereditary civil calendar of those quarters and of those nations, long before any of these derivative ones was substituted for it; as much as that of the inhabitants of the old world, Europe, or Asia, or Africa. But this is too important an inference to be merely alluded to. We will therefore stop, before we conclude our remarks on these subjects, to consider it a little more at length.

CHAPTER II.

On the inference of the fact of a common origin of all mankind, deducible from the fact of a common calendar.

SECTION I.—*Plainness and simplicity of the Scriptural doctrine of the origin of mankind; and the unwillingness of modern science and modern philosophy to acquiesce in it.*

IT is an obvious and spontaneous corollary, from the conclusions established relating to the original constitution, to the subsequent changes, and to the final or resulting condition, of the civil calendar every where; That the Scriptural account of the origin of all mankind must be true: because that and that only is consistent with this fact of an universal calendar, identical with itself every where, yet equally in use every where.

The teaching of Scripture itself on this point is so simple and intelligible, that even a child may comprehend it; yet the reason of philosophers and of men of science is not satisfied with it; and thinks itself entitled to call in question the truth of inspiration rather than believe it. It is uniformly the doctrine of Revelation, that all the communities of men and women, which are living at any time on the face of the earth, are the descendants of one man and of one woman, or at the utmost of three men and three women; that Adam and Eve were the parents of the whole antediluvian race of mankind; and that the three sons of Noah and their respective wives have been the parents of the whole of the postdiluvian. Its testimony to this great truth may be summed up in two texts; one the declaration of St. Paul to the philosophers of Athens, Ἐποίησέν τε (sc. ὁ Θεὸς) ἐξ ἑνὸς αἵματος πᾶν ἔθνος ἀνθρώπων κατοικεῖν ἐπὶ πᾶν τὸ πρόσωπον τῆς γῆς[c]: the other the last words of the tenth chapter of Genesis; "These *are* the families of the sons of Noah, after their generations, in their nations: and by these were the nations divided in the earth after the flood[d]."

Whensoever the natural tendencies of infidelity are allowed free scope, the extravagances into which it is liable to run are something wonderful; and had there not been repeated proofs of the fact how easily the spirit of scepticism is led astray from reason and common sense, it would not be conceivable that so much credulity on some points and so much incredulity on others could exist together in the same mind. Experience shews that nothing is too irrational for

[c] Acts xvii. 26. [d] Gen. x. 32: cf. ix. 19.

scepticism, even while it is pretending to the highest degree of reason; nothing is too monstrous for the faith of infidelity, if it can thereby escape from the belief of Scripture. A deceived heart having turned it aside[e], it willingly grovels in the dust, it greedily feeds upon ashes; it finds food to its taste in the most degrading and disgusting of pastures. It has wilfully rejected the truth, and it is compelled to believe in some LIE; and the more startling and extravagant the lie, the more congenial to the intellect of the sceptic; the more eagerly it is embraced, the more pertinaciously it is maintained. It has abandoned the clear and steady light, which alone could guide and direct it; and it is deservedly left to grope in the dark; or to follow the *ignis fatuus* of its own imagination.

Nor has the inherent tendency of this spirit to run wild and to luxuriate amidst the monstrosities of its own creation been more strikingly exemplified in any thing, than in the attempts which it has made to account for the origin of mankind, in contradiction to the simple testimony of Scripture. Books have been written to prove that this creature, whom we call man, "so noble in reason, so infinite in faculties, so express and admirable in form and moving, in action so like an angel, in apprehension so like a god, the beauty of the world, the paragon of animals[f]," was wriggled into his present preeminence both of body and of soul out of the mud of chaos; and is after all only the first-born of spawn and slime, a development of the eel or of the tadpole; to which one of those half organized forms, which the ancients have told us were left every year by the waters of the Nile on the surface of the land of Egypt, might claim relationship. It has been gravely maintained that the lord of the sublunary creation, the representative of the majesty of the common Creator over all the inferior creatures, (as Scripture most truly describes the original position of man in his proper system, and his original relation to it,) is but a younger brother, not of the angels, but of the ape, the baboon, the ourang-outang, or chimpanzee!

The difficulties connected with the rise and progress and intermixture of nations, when they are made the subject of historical research; the distinctions as well as the affinities of languages; the multitude of generic or specific types which appear to pervade the whole human family and its individual members, classing some together, but at the same time detaching and isolating them from the rest; the differences of physical structure which the analysis and comparison of the parts of the same human system, in different subjects and in different quarters of the globe, have been thought to

e Isaiah xliv. 20.

f Shakespeare, in Hamlet.

develope; external and superficial distinctions, such as those of the skin, the eyes, the hair, and the like: these, and various other perplexities which might be mentioned, are so many stumblingblocks in the way of the reception of this one Scriptural truth of the common origin of mankind, which very few in our own time are able to get over: so that whether from the gradual expansion of the principle of historical scepticism, which rejects all facts, however affirmed and accredited by testimony, which appear to be contrary to its own ideas of probability; or from the progress of linguistic researches; or from the pretended accessions to the stock of physiological science which are continually being made; probably no one simple statement, which rests or is supposed to rest on the *ipse dixit* of Revelation itself, is in so much danger of being renounced and given up on all hands, as this of the common origin of mankind.

SECTION II.—*Utility of the argument from an universal calendar, in opposition to these difficulties.*

In opposition to such a conclusion as this however, so contrary to the positive testimony of Holy Writ, one simple and undeniable matter of fact, from which every one possessed of common sense may draw the proper inference for himself, is worth a thousand arguments.

For let it be supposed that the actual state of the case was *this:* viz. That go where we might, into Europe or Asia, into Africa or America, into the frozen, the torrid, or the temperate regions of the earth, among civilized men or among savages and barbarians; in short, wheresoever men were to be found and under whatsoever circumstances of social existence; yet that, amidst every diversity of climate and every distinction of habits and modes of life, wheresoever our researches could penetrate into the abodes of social or into the haunts of savage life, men were still to be found speaking the *same language,* or what was evidently only a *dialect* of the same language: what rational person could hesitate to infer from such a state of the case as that, That men every where must have had the same origin? Would not an identical language be considered decisive proof of an identical origin? a proof more than sufficient to counterbalance the argument to the contrary, from any accidental distinctions perceptible among men also; however numerous, however undeniable, and we may add however inexplicable at first sight, they might appear?

Now though this hypothesis of a common language, which we

have been supposing, does not hold good, yet the analogous one of a *common calendar* does hold good. It has been demonstrated that go where we may, visit and explore any part of the world we please, inquire into, investigate, and compare together the measures of time which men are using at this moment any where, or ever have used, trace them back to their utmost possible extent, as we may, in Europe in Asia in Africa in America, under all changes of circumstances, through all revolutions and confusions of the course of things in other respects, through all states and conditions of society, moral, religious, and political, still with respect to the measures of time we must come to the same conclusion every where; viz. that the calendar is still and always has been the same; that this at least has never varied, whatsoever else may have done so; that this has continued identical with itself, or has never exhibited any other kind or degree of deviation from the standard of absolute identity, than what might be compared to the difference of dialects in a common language.

The inference from this state of the case is or ought to be as certain and as spontaneous as that from the other: That, if mankind have always been using and are still using the same calendar, they must have had the same origin. The calendar is the language of time. An universal calendar is an universal language of time. Nothing was so well adapted *a priori* to be the standing memento of the great fact of a common origin as a common calendar. The language of the calendar is immutable. It can never vary while the laws of nature remain the same; but language, in the proper sense of the word, is constantly changing; is constantly exhibiting new phases and phenomena; is constantly passing through new states. It is impossible that any thing like a combination of merely fortuitous circumstances could account for such a coincidence as this; which has held good among all nations and in all parts of the world for nearly 6000 years already, and will do so for as many more, if the world shall last so long. Nothing will account for it but the fact that men themselves have every where had a common origin; and have derived their calendar every where from the same source as their being itself.

SECTION III.—*Insufficiency of the grounds on which the Scriptural doctrine upon this point is called in question.*

At the same time, though we think this one simple and convincing argument is more than sufficient to refute the modern sceptical opinion on this point; we are far from allowing that, even without this, the reasons on which our historical rationalists or our modern phy-

siologists and philologists profess to found their conclusions to the contrary are competent even to palliate or excuse, much less to authorize and justify, the sweeping and indiscriminate, the bold and presumptuous, inferences which they build upon them; inferences which not only directly impeach the truth of inspiration, but strike at the root of Christianity itself.

The variations of colour in the external covering of the human body; the different magnitudes of the facial angle; the different forms and configurations of the skull; the different colour of the hair, or of the iris of the eye; a prominent forehead or a receding one; a lump more or a lump less on the cranium; a flat nose or a straight one, thick lips or thin, curly hair or woolly or straight; a diminutive stature or a gigantic one: it is not on such *notable* grounds as these, nor even on those of apparent distinctions of moral and intellectual capacity in one race of men compared with another at present, nor because of historical or linguistic difficulties and perplexities, that we should be justified in casting to the winds the fundamental truth, on which the entire fabric of Christianity itself is based; viz. that of the creation of one man and one woman only at first, in the possession of original purity, innocence, and perfection, worthy of the Creator and of the creature too; with which are inseparably connected the fact of the *fall;* the fact of original sin; the necessity of a Saviour to all mankind beyond and distinct from themselves; and the universality of the scheme of redemption, as designed for all and as extended to all, because *wanted by all alike.* These things are consistent, if mankind always have been and still are every where the descendants of this one pair: but not on the contrary supposition of distinct races from distinct roots or stocks. It would be difficult indeed for those, who maintain such a distinction as this, to shew us how *they* could be affected by the fall of Adam who were not descended from the loins of Adam; or how *they* could be concerned in the scheme of *redemption* who had never been affected by the *fall.*

SECTION IV.—*On the probable origin of the difference of colour in the human skin.*

Among the reasons above enumerated there is none, which in our opinion would not admit of a satisfactory explanation, and might not be resolved into some thing accidental originally, without calling in question the fact itself, except that of the difference of colour or complexion. The cause of this distinction between different races of mankind does not appear to be resolvable into accident. It seems to

have its foundation at present in a difference of constitution. There is at least underneath the skin of the human subject, every where, a natural reticulum or network, which anatomists call the net of Malpighi: and this is filled with a natural pigmentum, from which the skin derives its hue. Apart from this reticulum and from its natural coating, the skin of the Negro is as colourless as that of the white man. It is because the substance, which nature has interwoven with the texture of this membrane underneath the skin, is of different shades and varieties of colour, that the outer covering of the body also exhibits a corresponding variety of colour.

But even to admit this fact, and its foundation in an actual difference of physical structure at present; it would not justify the inference that the darker complexions must necessarily have had a different origin from the fairer. It is irrational and illogical to conclude, from the mere fact of this distinction, that the darker complexions must necessarily have sprung from a different stock at first from the fairer. We do not see the connection between the premises and the conclusion, in such a case as this. Things are not necessarily inconsistent which *we* cannot explain, if one is not diametrically repugnant to the other; which no one can say is the case in this instance. Something must be left for the trial of our reason; and whether it will in all things, as it is bound to do, submit itself to our faith; which is the Divine reason made our own by the act of faith itself. Nor does it follow that any one truth, once received on its proper grounds of proof, is to be given up, not because its own foundations have been shaken, but because something else has come to light, which at first sight, and on a superficial comparison of the two together, appears to differ from it: for that one truth will never be really inconsistent with another we may take for granted: and that further and deeper and more attentive inquiry and examination very often reconciles things together, which at the first view of each seemed to be at variance—every one's own experience may have assured him.

No one will surely maintain that a black skin is necessarily and *per se* a proof of a different origin from that of a white one. But with respect to the cause of this distinction in the skin itself, as far as it extends, we hope there may be no impropriety in proposing a conjecture; that differences of colour in the skin at present are not founded in any original differences of physical constitution. In support of this conjecture it might be mentioned that the "mark," alluded to in Genesis[g] as set upon Cain, has been explained by some commentators of a change made in the external appearance

[g] iv. 15.

of his skin; and it might be observed in like manner that the curse, which so soon after the flood took effect on Ham and on his posterity[h], possibly might be sealed and attested by the same kind of visible stamp.

These things might be conjectured. But the truth compels us to say, that in our opinion we should not be justified in regarding these distinctions of colour, under any circumstances, as brands of punishment or as badges of degradation; but rather as a provision of nature, wisely and benevolently intended for the benefit of those, who are discriminated thereby from the rest of their fellow men. It has been ascertained by observation, that the different shades of colour in the skin bear an appreciable ratio to the distinctions of soil and climate; and vary almost in a regular manner from the frigid to the torrid zones. The whitest complexion is found nearest to the poles; the greatest intensity of colour under the hottest sun: and there are almost innumerable shades of complexion, in proportion to the difference of climates, between these extremes of cold and heat. No one therefore ought to doubt that the peculiarity of constitution, to which the African negro owes his jet black complexion, is a provision of nature; to adapt his constitution itself to the peculiarities of his local habitation on the surface of the earth.

It appears to us most consonant to reason and probability *a priori*, and in no respect inconsistent with the actual testimony of Scripture, to conjecture that, when the Almighty interposed to bring about the Dispersion, according to his own will and appointment, whether men themselves would or not, by one miracle affecting their language; he intimated his pleasure in what parts of the earth each of the existing family-divisions of mankind should settle, by another miracle affecting the colour and complexion of the skin. For that the division of the world among the children of Noah was not carried into effect, even at the dispersion, without the direct interposition of God, is clear from Scripture[i]; and that he interfered not only to bring it to pass, but also to prescribe the manner in which it should take place, may reasonably be collected from Scripture too. Nor indeed is it conceivable in what manner but that it could have been orderly effected; or how, except through some such direction as this, each of the families of mankind could have known where they were intended to settle; or how the allusions of Revelation in subsequent references to the same topic, which are of such frequent occurrence in the Prophets, especially in Jeremiah and Ezekiel, could be so remarkably adapted to the simple historical account of

[h] ix. 25. [i] Genesis xi. 1–9: Deut. xxxii. 8: Acts xvii. 26.

the process of the dispersion, and of the division of the world among its subsequent possessors, in the first instance, which is given in the Book of Genesis.

On this question however we desire to propose nothing but a conjecture; which every one is free to receive or to reject as he thinks proper. Scripture it is well known is silent about any such second miracle; but that silence is no necessary proof that nothing of the kind took place*.

* The reader should compare with the argument, which we have been endeavouring to enforce in this chapter, the similar argument, from the use of a common rule of the noctidiurnal cycle, which we enforced supra. —Appendix to Diss. iv. ch. i. p. 221 sq.

These two facts, of a common rule of the noctidiurnal cycle and of a common calendar, mutually illustrate and confirm each other; and neither of them can be explained independently of the Scriptural account of the creation and of the dispersion.

END OF VOL. I.